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ROENTGEN RAYS IN THE TREATMENT OF NON-MALIGNANT DISEASE

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Perhaps because roentgen therapy occupies so prominent a place in the treatment of malignant disease, its beneficial effect in many benign conditions is often overlooked. In this field its application to diseases of the skin is probably best known. During the past few decades almost every known cutaneous affection has been treated with roentgen rays, and as a result of this experimental work it is now well recognized that about eighty skin diseases are amenable to roentgen or radium therapy. While it is true that roentgen rays produce a permanent cure in only a part of these diseases, there are innumerable instances in the other conditions where distressing symptoms can be relieved and rapid involution of an eruption brought about. Such diseases as localized bromidrosis, favus of the scalp, some forms of tinea capitis and tinea sycosis, blastomycosis and actinomycosis are usually not permanently cured without the use of roentgen rays. Of all treatments for acne vulgaris, roentgen therapy is acknowledged the best single agent available. Basal cell epitheliomas, various types of keratoses, lupus vulgaris, and other conditions comprise another group which can be cured or benefited by radiation alone but for which there are other successful methods of therapy.

It will not be attempted here to indicate even briefly the specific skin diseases in which roentgen rays may be employed. Attention will only be called to the fact that the eminent dermatologist MacKee[1] in his text, X-RAYS AND RADIUM IN THE TREATMENT OF DISEASES OF THE SKIN, has listed approximately one hundred dermatological conditions for which roentgen therapy has been found useful. Although this method of treatment may not be used as indiscriminately now as it was a few years ago, the field is indeed extensive, and the statement William Allen Pusey[2] made many years ago still holds true: "It is hardly too much to state that roentgen therapy is the most widely useful addition to the treatment of skin diseases that has been made."

Inflammatory Conditions

The treatment of inflammatory disease presents a large field for the use of roentgen rays, as certain of both the acute and the chronic inflammations may be amenable to this type of irradiation. In the instances where improvement does not follow the irradiation therapy no direct harm results and other methods of treatment are not thereby contraindicated. Any treatment given, of course, should follow the generally accepted principles of dosage, and no erythema should be produced during the treatment of the ordinary infections.

Some acute inflammatory conditions may even be treated with certain diagnostic type units. The tube voltage need only be moderate and the dose on the skin small. Many of the more deeply seated chronic inflammations, however, require more heavily filtered roentgen rays generated at the higher volt-

1. MacKee, George M.: X-Rays and Radium in the Treatment of Diseases of the Skin, ed. 3, Philadelphia, Lea and Febiger, 1938.

2. Pusey, William Allen: Principles and Practice of Dermatology, D. Appleton and Company, 1907, p. 161.

ages and treatments extending over a number of weeks. The more acute the process, the more dramatic the response.

The use of roentgen therapy in many inflammatory conditions has been ably reviewed by Reeves[3] in this Journal. Of these conditions, the furuncle and carbuncle are probably the lesions most frequently treated, and if they are irradiated early (within twenty-four to forty-eight hours of onset) the response may be striking. Some increase in pain may be noted about two to four hours after the treatment has been given. After this, abrupt relief, followed by rapid resolution, may be expected in a good percentage of cases. If the lesions are treated later, results are not as dramatic but treatment may still be worth while, as suppuration is usually hastened and the process better localized. In the treatment of carbuncles it may be necessary to institute drainage to provide exit for the pus and debris; therefore, it is always desirable that the radiologist work in close cooperation with the surgeon. A minimal amount of scarring should follow the use of x-rays.

In the acute parotitis that sometimes develops as a complication of abdominal surgery, and particularly following surgery of the colon, roentgen therapy is indicated. This inflammatory process, which formerly carried with it a formidable mortality, ordinarily responds exceptionally well. If the patient's condition does not warrant transfer to the x-ray room it may often be feasible to deliver enough treatment to the parotid gland areas at the bedside with one of the modern shockproof mobile units. There are some advocates for the use of radium in this condition, but this has the disadvantage of requiring a relatively long treatment time and application by strapping to areas that already are excruciatingly tender. Reduction in temperature and clinical improvement should be expected within twenty-four hours after roentgen therapy.

The simple acute adenitis frequently found in children responds well to roentgen rays of medium voltage and filtration. A rapid reduction in the size of the nodes may be noted within three days, and improvement of the child clinically before this. If the enlarged nodes can be treated early, practically none will need incision and drainage. If, as frequently happens, the adenitis is caused by drainage from the tonsils these can be removed when the infection quiets down.

Tuberculous lymphadenopathy also responds in a most satisfactory manner, though much less rapidly. It may require several small weekly treatments, whereas simple adenitis generally requires only a single treatment. When tuberculous lymphadenopathy is treated in this manner the nodes rarely break down, but even when they are caseous or draining successful results may be expected. This is the only form of tuberculous involvement that is treated by roentgen rays or radium.

Other inflammatory conditions amenable to x-ray therapy are localized areas of erysipelas, mycotic infections, herpes zoster, subdeltoid bursitis, paronychia, many forms of cellulitis, and certain selected forms of sinusitis, especially the subacute or hyperplastic type. These types of sinusitis are particularly responsive to treatment by roentgen rays in children. It would be useless to attempt any irradiation therapy of sinuses where polypoid and cystic degenerative changes are present. The radiologist must work in close cooperation with the attending otolaryngologist in cases of sinus infection.

Several reports published in late years, and particularly those of Kelly[4], indicate that excellent results have been obtained with the use of x-ray treatment in gas gangrene. These reports indicate a greatly lessened mortality and fewer radical amputations. Where there is an underlying diabetes or arteriosclerosis it is said to be more difficult to control the infection. It is noteworthy that roentgen rays are employed in the treatment of gas gangrene at some military encampments, and that mention was made of their use in some of the casualties at Pearl Harbor.

In years past infection was generally considered to be a contraindication to the application of roentgen rays, but this contention has not been borne out by more recent experience. It has been noted that almost invariably remarkable improvement of the chronically infected cervix follows the period of x-ray treatment administered to the pelvis preliminary to radium therapy for carcinoma of the cervix. With such clearing of

3. Reeves, Robert J.: Roentgen Therapy in the Treatment of Certain Inflammatory Conditions, North Carolina M. J. 4: 44-46 (Feb.) 1943.

4. Kelly, James F. and Dowell, D. A.: Present Status of X-Rays in Gas Gangrene, J.A.M.A. 107:1114-1118 (Oct. 3) 1936.

the infection fewer complications are encountered upon intrauterine insertion of the radium. Costolow[5], in a report dealing with the irradiation therapy of uterine fibromyomas, states that in 986 cases receiving pelvic irradiation only one developed an acute pelvic reaction. The inflammatory reaction in that one patient followed curettement and radium insertion.

Now that sulfonamide therapy is widely used in infections the question arises at times whether to use the drug and roentgen therapy concurrently. Opinion differs as to the advisability of this, and some experimental evidence has been put forth to show that results when both methods of therapy are used are not so good as when either is used singly. Such laboratory evidence, however, may be difficult of evaluation. Clinically there does not appear to be any contraindication to the use of a sulfonamide with the small roentgen ray dosage ordinarily employed for infections.

It has long been noted that rather striking reduction in the size of tonsils is seen incidental to roentgen or radium therapy of an adjacent malignant growth. Because of this direct observation and also because of the well recognized sensitivity of lymphoid cells and lymphoid tissue in general to radiation, it was assumed that roentgen rays might be beneficial in cases of overgrowth of lymphoid tissue in the pharynx and base of the tongue. This method of therapy has proven of real benefit to patients properly selected by the otolaryngologist and adequately treated. If the x-rays are delivered through lateral external portals of entry high voltage heavily filtered is required. The dosage should be such that adverse effects on the salivary glands are avoided. To eliminate completely any unpleasant reaction, the irradiation can be given to some individuals through the open mouth with one of the periscopic devices. Such treatments are best given at intervals of five to seven days over a period of perhaps six weeks.

Benign Neoplasms

Among the benign new growths amenable to irradiation therapy are the hemangiomas present at birth or appearing shortly thereafter. The port wine birth mark has to be excluded from this group, as it does not respond to x-ray or radium. The strawberry type with its bright red, stippled surface, so frequently found about the face and often multiple, responds well to radium or roentgen therapy, and excellent cosmetic results may be expected if it is properly treated. Many of the deeper cavernous hemangiomas will show an equally good response, but it is imperative that treatment be started as soon as the lesions are discovered. It is distressing to find that parents are sometimes still advised to defer any active treatment to see if the child will "outgrow" the skin changes. These benign tumors may grow remarkably in the first few weeks of life, and as the size increases it becomes increasingly difficult to get desirable cosmetic results. The more embryonal the cells, the better the response to radiation.

While it was generally believed a few years ago that radium was the agent of choice in the treatment of hemangiomas, it has become apparent that roentgen therapy may actually be preferable. When the introduction of shockproof equipment made the administration of x-rays safer, this form of treatment was found to have many advantages. Utilizing a high output from a tube, the treatment can be given within a minute or two, during which time the child can easily be controlled. The distribution of radiation from a roentgen tube is more uniform than that from many forms of radium applicators generally available. Perhaps this fact accounts for cosmetic results that appear much superior to those frequently obtained in former years.

The part that enlargement of the thymus may play in producing constitutional changes in children still is not definitely settled. When, however, enlargement can be demonstrated and when there is a possibility that it is displacing or compressing the trachea, causing stridor, dyspnea, and possibly cough, it has been customary in many quarters to irradiate the thymic area. The response to even a single small dose of roentgen rays is usually dramatic, with rapid reduction in the size of the thymic mass. This reduction in size may frequently, but not invariably, be accompanied by relief of the respiratory symptoms.

Under this heading it will also be well to mention the painful lesions on the plantar surface of the foot commonly known as plantar warts. This growth, more or less circular, is generally found on the sole near

5. Costolow, William E.: Treatment of Uterine Fibromyomas, J.A.M.A. 116:464-468 (Feb. 8) 1941.

the base of the great toe. It appears to be most prevalent in adults around the second decade and is found in many college students. This lesion, about ½ cm. or more in diameter, is generally sharply demarcated from the surrounding normal tissue and varies much in thickness, depending upon the length of time it has been present and also upon previous treatment.

A very high percentage of these warts can be cured by x-rays if walled off with lead and adequately irradiated with roentgen rays of moderate voltage. Sufficient treatment may be given at one time, but there may be some advantage in giving two treatments at an interval of one week. By the latter method there is rarely, if ever, any brief period of increased local pain, and after two weeks the wart decreases rapidly in size and soon disappears entirely.

Although it is possible to treat the ordinary clavus and some forms of callosities successfully in the same way, these can be handled more readily by other methods. It is only in special instances that radiological treatment may be required.

Uterine fibromyomas represent a large group of benign tumors from which a certain number may be referred for either roentgen or radium therapy. Here, however, it is necessary to state emphatically that the careful selection of the patient to be treated is the most important factor in achieving successful results.

It is first imperative that the diagnosis of fibromyoma should be established with as much certainty as possible and any question of malignancy ruled out. If there is any doubt as to the diagnosis or if the tumor is large, an operative method should always be the treatment of choice in patients whose physical condition permits it. If bleeding has been excessive and is more or less continuous surgical measures may be imperative.

An impression still seems to be prevalent that roentgen rays or radium act directly on the fibroid tumor. Nothing could be further from the truth, as the fibromyoma is probably one of the most resistant of all tumors to direct radiation. The reduction of the tumor is brought about by the effect of the irradiation on the ovaries. The induced menopause causes the fibromyomas to decrease in size, as they are known to do with the onset of the natural menopause. These tumors are said to occur in as many as half of all colored women and in a third of all white females. Certainly, then, a large number of them must simply atrophy at the normal menopause to such dimensions that they cause no clinical symptoms.

The age factor is of major importance in selecting patients for x-ray therapy. In young women it is desirable to preserve ovarian function, and simple removal of the fibroid from the body of the uterus would appear to be the treatment of choice Published figures indicate that perhaps one out of three young patients on whom this operation is performed later become pregnant. Therefore, this procedure is worthy of consideration, even though these tumors frequently recur later in life. Actually, however, myomectomy seems to have limited acceptance, as hysterectomy is the operation generally done.

Fortunately the greater number of fibroids cause symptoms only after the age of 40, and in these women the induction of menopause is only slightly premature. There is no scientific proof that any symptoms following an artificially induced menopause in such patients differ from those that would have followed a natural menopause.

The irradiation treatment of those patients who are selected and referred for this form of treatment is usually fairly simple. The total amount of roentgen therapy needed to bring about an artificial menopause is relatively small and should never cause any severe irradiation sickness. It should be emphasized that there is no immediate effect on the uterine bleeding, as not only the patient but frequently the referring physician may expect a decrease in bleeding as soon as the first treatment is given. If the irradiation is given at the time of menstruation or within a week thereafter there may be no further menstrual bleeding. If it is given later in the cycle, however, there may follow another regular period.

Either roentgen rays or radium or a combination of these agents may be indicated. Should the patient's general condition not warrant a major operative procedure roentgen rays combined with radium may frequently produce cessation of the bleeding more quickly than either agent alone. This is particularly true if curettage can be done at the time of intrauterine radium insertion. Where both agents are used the dosage of

each is reduced. Regardless of the type of irradiation selected there should be little attendant morbidity and no mortality. The simplicity of the procedure may be of advantage in the treatment of patients in the low income group where hospitalization would be a particular burden. This factor, however, should never override a decision based on the more important factors discussed above.

Hyperthyroidism

Roentgen therapy of toxic goiter has a definite niche, but it should be used as the sole agent only in patients who refuse operation or in whom operation is contraindicated by organic heart disease or other constitutional changes. It may, however, play an important part in the preoperative medical preparation of an individual who maintains a consistently high metabolic rate refractory to iodine. Also, many patients who have cardiac decompensation, whose toxic symptoms are rapidly increasing in severity, or who are failing to gain weight may show sufficient improvement following roentgen treatments to allow operation later. Such treatments may be given once or twice a week, with the internist continuing general management. Fortunately the myth has long been dispelled that such therapy produces connective tissue proliferation which will interfere with later operative procedures.

Perhaps roentgen therapy finds its widest application in the group of cases in which hyperthyroidism recurs postoperatively. Clinical cures can often be brought about in such recurrences by adequate irradiation.

The indiscriminate use of roentgen rays in the treatment of thyroid disease by careless practitioners the country over has brought this valuable form of adjunct therapy into rather wide disrepute. X-ray treatments were often given at relatively low voltage, with little or no filtration other than that inherent in the tube, and as a result many patients have suffered skin atrophy, telangiectases, and other evidences of a chronic radiodermatitis. Fortunately there does appear to be a real decrease in this widely condemned practice.

Summary

The application of roentgen therapy to the most commonly encountered benign conditions is described.

No details as to dosage and technique of administration are given. In general it may be said that low voltage roentgen therapy should be used only for the most superficial inflammatory processes; and that moderate or high voltage therapy with adequate filtration is needed for the majority of benign conditions in order to achieve good results with no danger to the overlying skin.

X-RAY AND RADIUM THERAPY IN LESIONS ABOUT THE EYE

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The use of x-ray and radium in the treatment of lesions about the eye requires more care and accuracy and probably carries more dangers than radiotherapy of any other part of the body. Richards[1] states that "there seems to be a wide-spread opinion, certainly among the laity and to a less extent within the profession, that radium and x-ray cannot be safely applied near the eye." Irradiation has been used successfully, however, in the treatment of a number of eye conditions, aside from benign and malignant growths, which have heretofore been resistant to the usual medical and surgical procedures.

Dr. Bucky, in 1927, advocated superficial treatment of skin diseases with very soft roentgen rays[2]. He treated blepharitis very successfully with these rays, which lie on the borderline between x-rays and ultra-violet rays. They have no depilatory action and are almost completely absorbed in the most superficial layers of skin. The areas treated are so very small that this apparatus never found favor with radiologists.

Beta rays of radium and soft x-rays have been found more desirable. Beta rays are obtained from unfiltered radium or radon emanation. Burnam[3] and Woods[4] have devised a special radium applicator for various eye lesions. These soft beta rays have a

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1. Richards, G. E.: Radiotherapy in Lesions About the Eye, Am. J. Roentgenol. 36:588-602 (Nov.) 1936.
2. Bucky, Gustave: "Grenz" (Infra-Roentgen) Ray Therapy, Am. J. Roentgenol. 17:645-650 (June) 1927.
3. Burnam, C. F., and Neill, William, Jr.: Use of Beta Ray of Radium Applicator, South. M. J. 33:279-286 (March) 1940.
4. Woods, Alan C.: Treatment of Tuberculosis of the Anterior Portion of the Eye with Beta Rays of Radium, Arch. Ophth. 22:735-742 (Nov.) 1939.

very limited penetration and are not likely to damage the lens. Their use in the eye is limited to lesions in the cornea, sclera, and possibly in the peripheral portions.

Inflammatory lesions which should be treated by irradiation are those which have resisted all the ophthalmologic therapeutic measures. In the case of tumors, irradiation is often selected rather than operation, either in the hope of saving vision or for better cosmetic results. The alternative is enucleation, followed by radiation.

The eye conditions suitable for irradiation are: corneal ulcers, vernal catarrh, recurrent pterygium, angiomas, tuberculous kerato-iritis, blepharitis, chronic conjunctivitis, and malignant lesions such as epitheliomas and lymphomas.

Treatment of Inflammatory Lesions

The inflammations are the conditions most amenable to treatment. In the treatment of vernal catarrh, results vary with the stage and degree of trouble. In the early cases, there may be only an itching, slight reddening, or photophobia. A single treatment may relieve the condition, but it is likely to recur the following spring, when it should be retreated. In severe cases, the conjunctiva may be coated with a warty growth which persists the year around. Treatments are usually given in 50 per cent of an erythema dose every two weeks, often with complete relief. The eye is anesthetized and the lids held open by a retractor so that the x-rays or beta rays can be directed to the lesion. Occasionally, in children, a general anesthetic must be given.

Blepharitis and eczema of the lids may be successfully treated by means of roentgen rays or radium. The lids are everted and the cornea protected by a shield. Four or five weekly treatments of 100 to 150 r are given, and if the infection has not cleared up, a month's rest is allowed before more treatments are given.

Treatment of Corneal Scars

Corneal scars are best treated when fresh or after excision and grafting. It is difficult to estimate the effect of radiation because of the tendency to spontaneous clearing. If the case is treated immediately after operation, the results are comparable to those obtained with treatment of post-operative scars elsewhere on the body. Old scars always improve some under radiation, and occasionally disappear completely. Some corneal scars give no symptoms, while others, even though small, may be centrally located, so that they affect vision. The treatments should extend over a year or more and should be given in suberythema doses, a month or two apart. Careful measurements of the scar should be made.

Treatment of Tuberculosis of the Eye

Tuberculosis of the cornea, sclera or iris responds readily to small doses of x-ray or beta radium. Drs. Alan Woods and Curtis Burnam of Baltimore have treated a large series of such cases with uniformly good results. However, in some cases there were later recurrences, which responded to prolonged treatment. Some patients were given beta radium therapy over a two-year period, with gradual improvement. Tuberculous kerato-iritis frequently runs a limited course and sometimes heals spontaneously. There may also be relapses and remissions over many years. There is usually more scarring with each attack, with an eventual corneal opacity. If the disease is arrested early, the vision can often be saved.

In these cases the x-ray and radium must be used in conjunction with supportive measures and frequently with tuberculin as a desensitizing agent. The mode of action of the irradiation is not well known. The experiment of Thompson, Pfeiffer, and Galardo indicates that there might be a mobilization of antibodies which would affect the tuberculous process secondarily[5].

Treatment of Tumors

Epitheliomas of the cornea present a very difficult problem. The lesions, even when small, often recur postoperatively. When the lesion is large, the eye should be enucleated and postoperative radium or x-ray given. Epitheliomas of the cornea are frequently very radiosensitive, and several writers have reported cases treated with irradiation without latent lens changes.

Very early epitheliomas of the lids may be completely removed by surgery or electrodessication, but when more than a few millimeters in size, they should be treated by beta radium or soft x-rays. The failures reported

5. Personal communication to the author.

are often due to insufficient treatment. The eye can be shielded with a metal plate, and the lens protected.

Lymphomas[6] and angiomas in or about the orbit should be treated by irradiation. Retinoblastomas are radiosensitive, but these often extend back along the optic nerve to the chiasm and affect the other eye. If treated early, they may be destroyed by radiation; but enucleation seems to be the method of choice.

Conclusions

The literature is laden with fantastic claims concerning the value of radiotherapy for all manner of eye diseases, including traumatic lesions, inflammations of the cornea, sclera, and uveal tract, cataracts, parasitic diseases, keloids, scars, blepharospasm, herpes ophthalmicus, and erysipeloid edema of the lids. Actually, although it must be used with great care, irradiation gives good results in certain ophthalmological conditions, including inflammations, corneal scars, tuberculous lesions, and neoplasms. The radiologist and ophthalmologist should work in the closest cooperation. Otherwise, the result may be failure.

6. Reeves, Robert J.: Lymphoblastoma (Hodgkin's Disease) of the Orbit, Am. J. Roentgenol. 17:642-645 (June) 1927.

The Industrial Front.—Three hundred and fifty million work days lost annually through illness of the gainfully employed is our country's discreditable record. At a wage of five dollars a day this means a $1,750,000,000 yearly deficit in labor and production. Assuming that half of this is due to preventable disease we could build a dozen battleships in the time saved by full use of known preventive measures.

In working days lost per case, tuberculosis heads the list of unnecessary disabilities. This national loss is not due alone to doctors, nor the public health service, nor the ignorance and carelessness of the people themselves. The blame belongs to all three. The fervor of patriotism sweeping the country keeps our eyes fixed overseas. We are united in the will to annihilate despotism and reestablish freedom for all nations. This is our duty, but we must not forget the treacherous enemy within our own boundaries. Tuberculosis, in collusion with its fellow fifth columnists, is impeding victory by a campaign of sabotage behind the lines.

The armed forces have foreseen the menace of tuberculosis in the ranks and are taking active measures to combat it. Industry has awakened to the threat but is still floundering in its effort to thwart it. The medical profession is only half alive to its opportunities for patriotic service. Right now is the moment to stand by the men who make the guns in an all-out fight to eradicate this leading saboteur of victory. Kendall Emerson, M.D., Journal Lancet, Apr., 1942.

THE USE OF MINERAL OIL BY MOUTH AND BY BOWEL

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Of all mild laxatives, mineral oil is probably used most frequently. Unfortunately, little attention has been paid by either patient or doctor to the injurious effects of the drug when given by mouth.

Within the past three years we have treated more than 200 patients with mineral oil by bowel. Incredible and inconsistent reports soon demanded an explanation of the action of the drug. A drug non-digestible, non-absorbable, non-irritating—how can it do much harm or much good?

Effects of Mineral Oil by Mouth

When we summarize the untoward effects of mineral oil given by mouth, we are forced to the conclusion that a large part of the relief obtained in the cases treated by bowel was due to the cessation of oral administration.

The following statement concerning the harmful effects of mineral oil is found in Bastedo's MATERIA MEDICA, PHARMACOLOGY AND THERAPEUTICS[1]: "It retards digestion by coating the particles of food . . . and interferes with the absorption of the products of digestion . . . It causes excessive loss of mineral salts, notably those of calcium and phosphorus. It lessens the normal stimulation of the bowel wall." Bastedo states further that mineral oil interferes with the absorption of vitamin A, and that "the possibility of mineral oil creating avitaminosis in the debilitated, in nursing mothers and in growing children cannot be ignored."

When mineral oil interferes with the reabsorption of bile, it upsets the whole digestive process. Stengel and Kern, of the University of Pennsylvania, state[2]: "Bile aids digestion, is antifermentative and hastens the removal of fermented food from the intestinal tract." According to F. C. Mann,

Read before the Section on the General Practice of Medicine and Surgery, Medical Society of the State of North Carolina, Raleigh, May 12, 1944.

1. Bastedo, W. A.: Materia Medica, Pharmacology and Therapeutics, ed. 4, Philadelphia, W. B. Saunders, 1937, p. 178.
2. Stengel, A. and Kern, R. A.: Function of Bile, in Nelson Loose Leaf Living Medicine, New York, T. Nelson and Sons, vol. 5, p. 483.

of the Mayo Foundation[3], "Bile salts are important for normal digestion of fats and are especially valuable in the absorption of the fat soluble vitamins."

Food not digested decomposes. Opinions differ as to the effects of these products of decomposition. Bastedo[4], speaking of calomel, says, "If the action is not severe enough, the bowels are not thoroughly cleaned out, and the result is autointoxic headache and lassitude . . . The calomel hastens the undigested food through the small intestine to the colon, where the putrefactive bacteria are located . . . these bacteria generate [from the undigested food] an extra amount of poisons of the indol type." This decomposition of undigested food in the colon caused by mineral oil and certain other laxatives explains the disappearance of gas and the improvement in the patient's sense of well being which follow the discontinuance of such laxatives by mouth. Mineral oil by mouth prevents digestion of food by coating it in its passage to the colon, and other laxatives hasten the food to the colon before complete digestion can take place. The gases and toxins of decomposition are injurious to everyone, and especially to old people. In a patient with heart disease they may be fatal.

Anal eczema resulting from the use of mineral oil by mouth has been observed. This was not a direct effect of the oil, but was caused by the indigestion and the catarrhal condition of the colon which the oil produced. Leakage of mucus kept the area coated with a warm, damp, acrid discharge teeming with bacteria grown on the undigested food in the colon. Infection of the skin by this acrid discharge is one of the causes of pruritus ani. We have satisfactorily treated a few cases of this disease with mineral oil by bowel, nitrate of silver used locally every few days for a short time, and applications of mercuric iodide after each evacuation, and oftener if necessary to keep the parts clean.

Effects of Mineral Oil by Bowel

As was stated above, part of the good results obtained with the use of mineral oil by bowel must be attributed to the discontinuance of oral administration. This alone could not account for the drastic improvement noted in cases of severe constipation, however.

3. Mann, Frank C.: Liver and Medical Progress, J.A.M.A. 117:1577-1582 (Nov. 8) 1941.
4. Bastedo, W. A.(1), p. 187.

To explain the action of the drug on the lower bowel, the following crude theory was tentatively adopted: The colon and rectum are supplied by the same group of nerves which control the large bowel. We know that a mild stimulation or irritation of the rectum, such as is supplied by a suppository or enema, causes an evacuation, and that a severe irritation or stimulation, such as is caused by piles or fissure, leads to spasticity and constipation. These facts would indicate that the rectum has great control over the colon.

Mineral oil is a most effective sedative to an irritated rectum. By its soothing action, it reduces the voltage of nervous impulses to the colon and so controls spasticity; and by its weight and bulk, it acts as a mild stimulant, sending a continuous low voltage current to the colon. Mineral oil by bowel acts on the lower bowel alone. It permits complete digestion of the food in the small intestine.

Reports obtained from the first 100 patients treated with mineral oil by bowel were most disconcerting. Reports of unbelievably good results were mixed with stories of complete failure. It soon became apparent that the more severe the symptoms, the more striking were the results. The patients with mild, atonic constipation, requiring an occasional laxative, reported no improvement, while in the severe cases of constipation and in all cases of rectal irritation with or without spasticity good results were obtained. There is no report of failure to obtain much relief in a case of severely irritated rectum. The relief of spasticity is sometimes surprisingly prompt. In a very few cases of constipation, the drug gave good results for a year or more and then gradually failed to give perfect relief. Frequently, after using the oil for some time, the patient is forced to reduce the dose. The oil acts as a soothing, protective dressing which permits the tissues to recover and the muscles to regain their normal tone.

The dose of oil varied from 10 to 30 cc. In most of the cases treated, 15 to 30 cc. of the oil was used at bedtime only, but in severe cases of hemorrhoids, better results were obtained by the use of small doses of the oil after each evacuation. Some patients could not retain 10 cc. of the oil. In these cases petrolatum (petroleum jelly) was used.

Petrolatum is also used in cases of constipation occurring in babies and small children and in cases of atonic constipation.

Simple atonic constipation is more difficult to treat. There is no irritation or spasticity, but merely a want of tone. Mineral oil acts better as a sedative to the rectum, and indirectly to the colon, than as a tonic. Two parts of petrolatum to one part of oil usually acts better than oil alone in the atonic case. Fifteen to 25 Gm. of the mixture after the bowel action in the morning and 25 to 50 Gm. at bedtime are prescribed, along with cascara or senna three times daily. Most patients with *pronounced* simple constipation probably have an irritated rectum and some spasticity. In these cases, a mild laxative (other than mineral oil) should be given by mouth, along with 15 to 30 cc. of the oil by bowel at bedtime. Usually the oral laxative can be discontinued after a shorter or longer period. The chances of cure are much better in these cases than in cases of simple constipation without spasticity.

Cases Treated With Mineral Oil by Bowel

Case 1. Miss Y., aged 38, a strong, healthy looking woman who had had an appendectomy some years previously, was badly constipated and complained of severe spastic pains throughout the abdomen. She had great difficulty in keeping the bowels open, and the colon and rectum were irritated by the hard feces. She had been treated in a large medical center for months with little relief.

She was instructed to inject 30 cc. of mineral oil into the rectum at bedtime, to discontinue the oil by mouth and to cease taking other laxatives as soon as she could. Within a few weeks, she reported incredible relief. She was having a free, easy movement every morning with no laxative other than the oil by bowel at bedtime, and she was almost free of pain.

Case 2. Mr. W. L. A., aged 56, had had rectal pains for years, and for several months the pains had been severe. Purgatives did not move the bowels freely. Rectal examination revealed a round ulcer more than ½ cm. in diameter. All laxatives by mouth were stopped and 30 cc. of oil was taken by rectum at bedtime. In a few weeks the patient was completely relieved and the bowels were moving freely every morning. After using the oil for five or six months, he laid the syringe aside. When he was examined three months later the ulcer had healed perfectly, the bowels were moving normally without the use of oil or any other laxative, and he had no discomfort.

Three months after this, immediately following a cataract operation, the patient had an acute obstruction of the bowel due to adhesions resulting from an appendectomy performed years previously. He was later operated upon for the adhesions. Did the oil relieve a spasticity due to both the ulcer and the adhesions?

Case 3. Mr. J. A. B., aged 82, has several diverticula of the colon. He suffered more or less continuously with abdominal pain for years, and not infrequently the pain required a hypodermic. He had great difficulty in keeping his bowels open, and took large doses of mineral oil, other laxatives, and enemas. All laxatives by mouth were stopped and oil was taken by bowel. Within a short time his digestion was better, the bowels were moving freely without any laxative by mouth, and he was free of all pain. After a few months, he could go for days at a time without needing the oil. The pain was probably caused by the spastic contractions of the colon pinching the diverticula.

The patient used the syringe for eighteen months, and for the past year he has been perfectly comfortable without any treatment other than the use of the syringe one or two times a month.

Case 4. Mrs. J. A., aged 55, had an extremely spastic and painful rectum. There were long skin tabs around the anus, and the surrounding skin was raw, cracked and bleeding. There was an occasional show of blood from the rectum. It was impossible to make a rectal examination because of extreme pain and spasticity. She kept the feces semi-liquid with mineral oil and milk of magnesia. After all laxatives by mouth were stopped and mineral oil was taken by bowel for a short time, the large Brinkerhoff speculum passed easily without pain and exposed a round ulcer 1 cm. in diameter. All pain had disappeared, the skin surrounding the rectum had healed, and the bowels moved every morning without any laxative other than 30 cc. of oil by bowel at bedtime. One year later, the ulcer has almost healed and the skin tabs are only a fraction of their former size. The skin condition surrounding the rectum was caused by leakage of the

warm acrid discharge, teeming with bacteria from the colon, which was due to the mineral oil taken by mouth.

Case 5. Mrs. T., aged 30, a strong, healthy woman, complained of severe burning pains in the rectum and severe pains radiating through the abdomen. There was an occasional show of blood from the rectum. Examination revealed a complete laceration of a posterior crypt of Morgagni. Mineral oil by bowel gave complete relief in four days. The bowels moved freely and painlessly every morning following the administration of the oil by bowel at bedtime. Five months after the beginning of treatment the fissure had healed; the patient was free of pain, and the bowels were moving regularly without any treatment.

Case 6. Mrs. A. L., aged 60, had been constipated all of her life, and badly constipated for the past few years. Drastic purgatives and enemas were required to get an action every two to four days. She said that during the three days preceding her visit to the office she had taken nine compound cathartic pills, 2 ounces of castor oil, and an enema to get one action of the bowels. Three weeks later she reported that "one half teaspoonful of Simmon's Liver Regulator by mouth and 30 cc. of mineral oil by bowel at bedtime is followed by a free, easy movement the next morning." A few weeks later she discontinued the laxative by mouth. Eight months later, she reported that she had taken no treatment whatsoever for two months, that the bowels were acting freely and easily every morning, and that she felt like a different woman. This was a typical case of spastic constipation with rectal irritation. These cases are very difficult to treat by the present routine method but they frequently yield quickly to mineral oil by bowel. Barring organic obstruction, one can feel reasonably confident of a cure.

Case 7. Mr. A. W., aged 47, a weak, emaciated man, was extremely nervous and irritable; he slept poorly, was badly constipated, and had no appetite. He had been treated by good men in two clinics. Both had prescribed vitamins and rest. When he entered our clinic, he and his wife said he was growing worse. All treatment was stopped and mineral oil by bowel was prescribed. One week later, he reported great improvement. He was sleeping better and eating more, and the bowels were moving freely and easily. He reported three months later that he had been doing two men's work, and that he was eating better, sleeping better and feeling better than he had in ten or fifteen years. This was a typical case of spastic constipation.

Case 8. Mr. K., a husky man, aged 42, had had chronic constipation for years. He took purgatives regularly and strained at stool. He said he felt as though his rectum had "grown up". Mineral oil by bowel was prescribed. The first week of the treatment he took two doses of laxative by mouth and the second week, one dose. After that he needed no further laxative by mouth.

Conclusion

Mineral oil by bowel is most soothing to an irritated or inflamed rectum, and it gives much relief in cases of inoperable hemorrhoids. It lowers the voltage of the reflex current to the colon and thus relieves spasticity. It acts by its weight and bulk as a mild stimulant to the colon. Its chief benefit, however, is probably due to the discontinuance of all laxatives by mouth.

We have used this method of treatment in more than 200 cases, and have found that, although mild constipation is seldom relieved by it, the results obtained in cases of severe spastic constipation are often dramatic. Eight typical cases of stubborn constipation which were cured with mineral oil by bowel are reported.

Psychologic Elements in the Treatment of Fatigue.—Treatment must be directed by an analysis of the type of fatigue in each case. Rest is the basic treatment in all types, but the duration and frequency vary. A pleasant environment, adequate diet and interesting social activities, often combined with physical activity, are essential parts of the rest period. As more is learned of the psychologic aspects of fatigue, it is being recognized that such factors as rest periods, the taking of food during working hours and a variety of other changes in working conditions operate in a substantial measure through psychologic rather than direct physiologic mechanisms. This is strikingly illustrated in a table published by Dill showing the output of a group of skilled persons working under carefully controlled conditions. It is noteworthy that practically every alteration led to an increased output; even returning to earlier conditions resulted in increases. The conclusion seems valid that optimal working conditions may be determined by factors other than purely physiologic ones, such as work and rest periods, food, lighting and heating. It can probably be assumed, however, that in the study mentioned above these factors were adequate from the start, and there is evidence that even with great motivation, output cannot be maintained if the working hours are excessively long.—Hoff, Hebbel E.: Physiology, New England J. Med. 229:544 (Sept. 30) 1943.

SIMPLIFICATION OF THE METHOD OF ELECTRICAL EXAMINATION AND THERAPY OF NERVES AND MUSCLES

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Difficulties, both of a theoretical and of a practical nature, which have arisen in the past have made electrical examination and therapy of nerves and muscles less popular than it should be. At the present time the requirements of military surgery demand a thorough knowledge of the degree and kind of lesions of peripheral nerves, since *early* suturing of severed peripheral nerves by the neurosurgeon has such an extremely favorable prognosis.

I believe that both theoretical and practical difficulties in the electrical examination of peripheral nerve lesions can be reduced considerably, so that the method becomes available as a valuable adjunct to other means of examination. Let us consider those difficulties more closely.

Theoretical Difficulties and Their Elimination

We know about the very interesting phenomena of direct and indirect electrical stimulation, of chronaxie of nerves and muscles under normal and pathological conditions. We know about formulas concerning cathodic closure- and opening-contractions, cathodic- and anodic-openings and closure tetanus, sluggish and rapid contractions, direct and indirect excitability, galvanic and faradic contraction, normal and pathologic values of rheobasis, threshold voltage and chronaxie of different muscles and nerves. It all looks very theoretical and, although of practical value, it cannot be applied in a short routine examination. If we realize, however, what we want to know from the practical point of view, we do not need any so-called degeneration formula. We only need information about two points: (1) conduction in the peripheral nerve, and (2) degeneration in the muscles supplied by the nerve.

(1) *Conduction in the peripheral nerve.* This can be determined by applying our electrical stimulation (galvanic or faradic) on the peripheral nerve through the skin at a point located above the injury. In case of interruption of the conduction, the muscles supplied by the nerve will not respond to the current. In case of partial loss of conduction, the muscular response is reduced as compared with that on the normal side of the patient. This reduction in conductivity can easily be determined by a reading of the threshold of contraction on the milliammeter of the stimulator.

(2) *Degeneration in muscles supplied by the nerve.* About two weeks following nerve injury, degeneration of the muscles begins. *The main characteristic of degeneration is the sluggishness of the muscular contraction elicited by direct stimulation of the muscle with direct (galvanic) current.*

In the two paragraphs above the essentials of the so-called reaction of degeneration (R.D.) are given. If the examiner possesses some knowledge of motor-points, the reaction can be determined in a few minutes. If we want a little more information, we may also determine the threshold of direct muscular contraction with direct current. In the case of degeneration this threshold is decreased for a certain period. In normal subjects stimulation with the cathode has a greater effect than does that with the anode. In pathologic conditions, the inverse effect prevails. In severe cases, the direct faradic excitability of muscles may disappear.

For practical purposes, all the other factors are of minor importance as compared to the two main points: *conduction* and *degeneration.* Thus, the galvanic current will practically always be sufficient for our purposes.

Practical Difficulties and Their Elimination

So far theoretical difficulties and their elimination have been described. A second group of difficulties is found in the apparatus used for electrodiagnosis; they constitute factors met practically.

Electro-medical apparatus as used to determine the so-called reaction of degeneration (R.D.) in peripheral nerves and muscles, and for therapy such as stimulation, consists at present of voluminous devices. They are expensive and require various manipulations, the patient being connected with the device by means of wires with detachable electrodes. One of these electrodes is used as a

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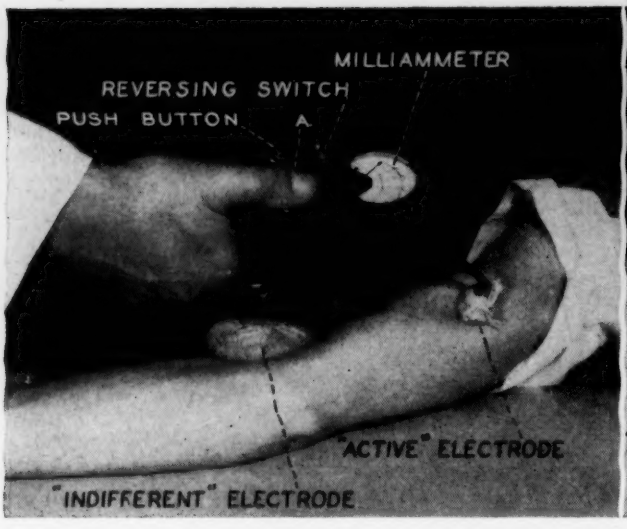

Fig. 1
A. Selector switch.

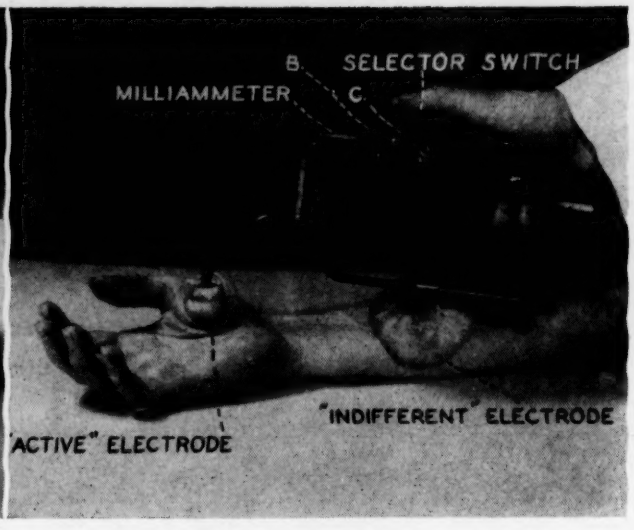

Fig. 2
B. Switch for reversing current
C. Push-button.

stimulator in connection with an attached switch. The other, "indifferent" electrode is larger and is placed on a different part of the patient's body. The main device contains switches and meters, so that the examiner has to divide his attention between this part of the machine and the stimulator. He must have an assistant if he wants to concentrate on his purpose: observation of the effect of the current on the stimulated muscle and nerve.

I have therefore designed an instrument[1] (fig. 1 and 2) which combines in one single holder the "active" and the adjustable, "indifferent" electrodes; a meter for measuring the amount of milliamperes used; a selector switch for regulation of the strength of the used current (A); a push button (C) for opening and closing the current; and a switch (B) for reversing the current. The apparatus has been built according to these principles by Harry Dauber. The device has to be operated with direct current, either from a battery or from a power supply operating from a line. If desired, the power supply can be built in the handle. The apparatus may be designed for direct current, for faradic stimulation, or for both.

The unit is as small as possible, light in weight, portable, and relatively cheap. The device will permit a widened field for the application of electrical examination and therapy; for not only specialists in neurology, but also general practitioners, surgeons, physiotherapists, and army doctors in field ambulances would be able to use it with ease. The last mentioned use is important in the distribution of wounded soldiers to hospitals where an immediate suturing of peripheral nerves is possible.

As has been said before, a galvanic apparatus is capable of serving simplified diagnostic purposes almost completely. It is also sufficient for therapeutic purposes. For example, after suturing of a nerve, daily galvanic stimulation will counteract muscular atrophy during the period before conduction is re-established. As was mentioned above, the muscle becomes inexcitable by *faradic* current in severe cases (total degeneration). Faradic stimulation could not counteract atrophy in such cases, in contrast to galvanic therapy. A simplified stimulator without the meter would be easily operable by the patient himself if the doctor pointed out to him the location of the motor points where he should apply the "active" electrode.

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The Physician as a Public Speaker

It would be of great advantage to all physicians who are called upon either to lecture to classes or to speak in public to take a course of lessons in elocution. Not only would they learn how to make the voice carry with the least possible effort, but, which is not less important, also learn the value of the pause. The pause rests not only the speaker but his audience. The untrained speaker unfortunately thinks it necessary never to cease vocalizing; if words fail him for a moment, he fills the interval with distressng er-er's. If instead he was to pause and knit the brow impressively, or even scowl at some meek looking auditor while awaiting reinspiration, the effect would be improved. It is resorting to such rhetorical artifices that makes the so called magnetic speaker. The coveted magnetism is no greater mystery than that.—N. Y. Med. Jour., Oct. 30, 1909.

PERIPHERAL CIRCULATORY FAILURE ITS MECHANISM AND TREATMENT IN MEDICAL DISORDERS

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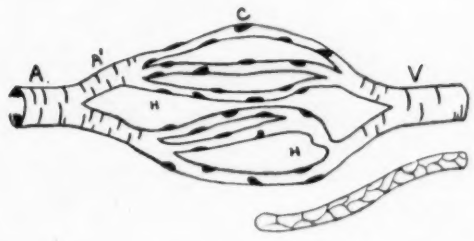
Failure of the peripheral circulation is so frequently the cause of death in medical disorders that it must be considered a matter of utmost importance.

The mechanism of peripheral circulatory failure associated with medical disorders resembles in many respects that which gives rise to the capillary failure complicating surgical conditions. There are, however, sufficient differences to make it distinctive and to warrant separate consideration of the subject.

In a discussion of the peripheral circulation there are several fundamental considerations which must be kept in mind. First, there are those anatomical structures which are directly involved in the production of the phenomena associated with circulatory failure. Second, there are those normal physiological conditions and processes which must exist and operate in order to prevent the development of circulatory failure. Third, there are those pathological conditions and processes which constitute the mechanism underlying peripheral circulatory failure.

Anatomical Considerations

It can be said that, in one sense, all bodily structures are involved in the failure of the peripheral circulation. This is true because when the peripheral circulation fails every tissue in the body suffers from anoxia and every function of the body is, more or less, disturbed. We are interested at this juncture, however, in those anatomical structures which constitute the peripheral vascular system. The components of this part of the circulatory system (fig. 1) are the small supplying artery (A), the arteriole (A^1), the capillary (C), and the collecting vein (V). The hydrostatic pressure exerted by the fluid in the interstitial spaces also plays a significant part in determining the efficacy of the capillary circulation[1].



PERIPHERAL VASCULAR SYSTEM

Fig. 1

Physiological Considerations

It is generally agreed that the production of toxemic, as well as all other varieties of peripheral circulatory failure depends upon the development of two abnormal conditions of the circulation[2]. These are: (1) a reduced return flow of blood to the heart, and (2) capillary stasis. As Wiggers has suggested, this type of failure may result from a disturbance of function at any one or more points in the peripheral vascular system (fig. 1). In the general vascular system and in the supplying artery (A), there may be such a decrease in the circulating blood volume that the arteriolar constriction at A^1 can not compensate for it and the circulation of the blood through the capillaries becomes inadequate. In this instance, the return flow of blood to the heart would be reduced and capillary stasis would result. Such a condition is seen in hemorrhage[3], traumatic shock[3], and hypo-adrenalism[4].

On the other hand, the blood pressure in the general vascular system may be so low that the blood can not be propelled through the capillaries effectively, and capillary stasis and reduced return flow of blood to the heart may thus result. This type of failure may be seen in the hypotension associated with inadequate cardiac filling.

Peripheral circulatory failure arising as a result of the disturbed function of the arterioles (A^1) may be due either to spasm and undue constriction of the arterioles, or to generalized arteriolar relaxation. In the former condition normal pressure or hypertension in the arterial system can not overcome the resistance in the arterioles; in the

From the Department of Internal Medicine, Rowan Memorial Hospital, Salisbury.

Read before the Section on the General Practice of Medicine and Surgery, Medical Society of the State of North Carolina, Raleigh, May 12, 1943.

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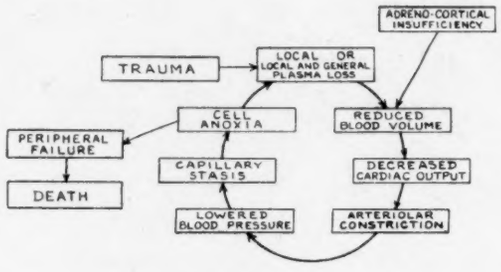
2. Wiggers, Carl J.: The Mechanism of Peripheral Circulatory Failure, Ann. Int. Med. 15:178-189 (Aug.) 1941.
3. (a) Moon, V. H.: Shock and Related Capillary Phenomena, New York, Oxford University Press, 1938.
   (b) Marsh, Frank B.: The Plasma Protein: Its Physiology Relative to the Normal and Failing Peripheral Circulation, Mil. Surgeon, 90:76-85 (Jan.) 1942.
4. (a) Rhoads, J. E., Wolff, W. A., and Lee, W. E.: The Use of Adrenal Cortical Extract in the Treatment of Traumatic Shock of Burns, Ann. Surg. 113:955-968 (June) 1941.
   (b) Best and Taylor(1), p. 1115.

latter, arteriolar incompetency allows a flooding of all capillaries, including the normally inactive ones, so that the blood pressure drops, capillary stasis develops and the flow of blood to the heart is reduced.

Several conditions may give rise to disturbances of function in the capillary bed. First, inordinate dilatation of physiologically inactive capillaries, producing the picture described above, may result from traumatic shock, syncope, anoxemia, and other conditions. Second, increased permeability of the capillary wall, allowing the escape of the plasma element of the blood from the intra- to the extravascular spaces, may bring about a reduction in the total blood volume, a decreased return flow of blood to the heart, a diminished cardiac output, and hemoconcentration. This type of capillary disturbance is found in acute traumatic shock[3] (fig. 2), adreno-cortical insufficiency[4a], anoxemia[3a], hyperpyrexia[5], and vitamin B deficiency. Third, disturbance of the filtration and osmotic processes of the body[1,6] may prevent the normal interchange of water with its dissolved substances which is carried on between the intra- and extracellular spaces and by which the proper relation between the intravascular and extravascular fluid volumes is maintained. The satisfactory operation of the filtration and osmotic processes depends upon two factors: (1) proper electrolyte balance[6], and (2) normal plasma protein concentration[1,3b]. The term "proper electrolyte balance" implies the existence of an exact relationship between the quantity of the sodium ions in the extracellular fluid and the potassium ions in the intracellular fluid. An excess of the sodium ion gives rise to a retention of water which should be eliminated from the body—that is, edema. A deficit of sodium allows the escape of water which normally should be retained in the body—that is, dehydration. The development of either one of these conditions decreases the adequacy of the peripheral circulation. Any appreciable decrease in the concentration of plasma protein in the blood so interferes with the operation of the osmotic process as to bring



THE DEVELOPMENT OF SHOCK FROM TRAUMA

Fig. 2

about abnormal shifts in the water and salt distribution, thereby diminishing the effectiveness of the peripheral circulation.

The blood is propelled from the capillaries back into the right side of the heart by an effective venopressor mechanism[2]. This mechanism is a driving force which is made up of several different factors: (1) the systemic pressure which remains after the blood has been driven through the capillaries, (2) a negative pressure in the thoracic veins, and (3) certain subsidiary forces which are held to be (a) an extravascular support produced by the elasticity of tissue, the contraction and tone of muscles, and so forth, (b) the pumping effect of respiration, and (c) an active contractile function of the small veins and venules.

The only disturbance of noteworthy significance which may develop in the venous side of the circulatory system (V) is that of increased venous pressure. When the venopressor mechanism becomes ineffective for any reason, there develops in the collecting veins a back pressure which impedes the circulation of blood through the capillaries and results in capillary stasis and a reduced flow of blood to the heart. This type of peripheral failure may result from a variety of intrathoracic diseases. The most frequent cause for it, however, is acute and chronic myocardial failure.

It is obvious from the foregoing discussion that the two abnormal conditions necessary for the production of peripheral circulatory failure may be produced in a variety of different ways. Let us now discuss the mechanism for the production of the peripheral failure as it operates in several of the most frequently encountered medical disorders.

Acute Infections

In the more acute and fulminating infections, such as pneumonia, influenza, and vir-

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   (b) Blalock, Alfred, and Mason, M. F.: A Comparison of the Effects of Heat and Those of Cold in the Prevention and Treatment of Shock, Arch. Surg. 42:1054-1059 (June) 1941.
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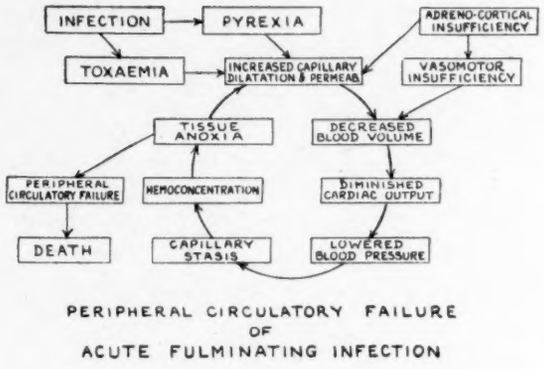
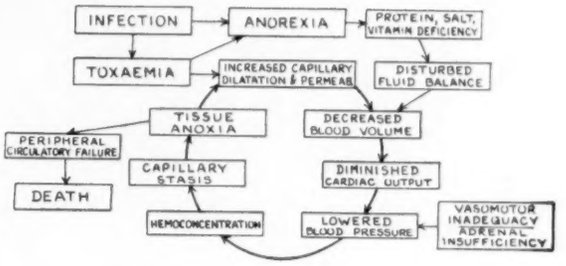


PERIPHERAL CIRCULATORY FAILURE
OF
ACUTE FULMINATING INFECTION

Fig. 3



PERIPHERAL CIRCULATORY FAILURE
OF
CHRONIC INFECTIOUS DISEASE

Fig. 4

ulent septic processes, the peripheral circulatory failure which arises is strikingly similar to that seen in acute trauma[3b] (fig. 2 and 3). The essential difference between the two conditions lies in the kind of trauma which initiates the pathological changes. In the latter it is the trauma of violence, while in the former it is the trauma of bacterial toxins.

In both conditions, the dilatation of the capillaries and the increased permeability of the capillary walls are brought about in exactly the same manner. Decrease in blood volume, diminished cardiac output, and concentration of the cellular elements of the blood occur in rapid succession. Hemoconcentration, increased viscosity of the blood, and circulatory stasis occurring in the capillaries give rise to anoxemia. The tissue anoxia, as it increases with the progression of the disturbance, causes greater dilatation of the capillaries and a more pronounced increase in capillary permeability. Thus there occurs a more widespread and profuse loss of the plasma element of the blood and a greater decrease in blood volume. As the process advances, the arteriolar constriction fails to compensate for the decreasing blood volume, the blood pressure drops, the vital centers suffer from anoxia, and death supervenes within a few hours to a few days.

In acute infections the factors contributing to the peripheral circulatory failure are: (1) pyrexia[5], (2) adreno-cortical insufficiency[4a] which gives rise to a greater degree of permeability of the capillary wall and a disturbed water balance, and (3) vasomotor paresis, which causes dilatation of physiologically inactive capillaries and allows pooling of blood in them. This draws further upon the circulating blood volume and facilitates the failure.

Insomuch as the mechanisms underlying the peripheral circulatory failure of acute fulminating infection and acute traumatic shock resemble, to the same extent do the two conditions require the same kind and character of therapy[3b]. The immediate, adequate, and, if necessary, repeated intravenous administration of blood plasma is the only competent and satisfactory means of treatment for the capillary failure which may occur in the two conditions. In addition, specific chemo- or sero-therapy, intravenous fluids and electrolytes, hydrotherapy, oxygen administration and parenteral adrenocortical extract are necessary adjuvants in the proper treatment of capillary failure associated with the more acute infectious diseases.

Acute Diarrheal Diseases

In the acute infectious diseases associated with profuse diarrhea, such as cholera, acute diarrheal diseases of infancy, and the acute phase of non-specific ulcerative colitis, the peripheral failure frequently comes on very rapidly. The additional factor of protein and electrolyte loss by way of the gastrointestinal tract, along with the operation of the basic shock factors, usually creates an emergency of extreme significance. So rapidly does the reduction in blood volume occur, the decrease in cardiac output develop, the hemoconcentration and capillary stasis appear, and the anoxia of the vital centers supervene, that, unless proper measures are carried out, the death of the patient will result in a very few hours.

The treatment in this instance must consist of the immediate intravenous administration of blood plasma in quantities sufficient to restore and maintain an adequate blood volume. The restoration of the electrolyte balance and the normal fluid distribution are also of extreme importance. The

adjuvant treatment previously indicated for acute infections must be administered.

Chronic Infections

In the more chronic infections the development of the pathological changes (fig. 4) is much less rapid and, of course, much less spectacular. While the basic shock factors operate in much the same manner as in the acute infections, only more slowly, there are other aspects of this condition which are worthy of mention.

The anorexia resulting from infection and toxemia prevents the ingestion of adequate quantities of proteins, vitamins and electrolytes. The stores of these substances are depleted, with the development of hypoproteinemia, avitaminosis and dehydration. Pyrexia, adreno-cortical insufficiency[7] and vasomotor inadequacy bring about the effects previously ascribed to their development. All of these disturbed physiological processes slowly, over a span of many days to many weeks, bring about peripheral circulatory failure and the death of the patient.

In the treatment of this type of infection, too, emphasis must be placed upon the maintenance of an adequate protein intake. As long as the necessary quantity and character of nourishment may be given by mouth, that, of course, suffices. In most instances, however, oral ingestion must be supplemented by the intravenous administration of electrolytes and blood plasma[3b] or amino acids[8] in the proper combination. An attempt must be made not only to maintain a normal plasma protein concentration, but to restore and maintain the body stores of protein. It is only in this way that the liver[9] and probably other vital organs can be protected against the ravages of the various bacterial toxins to which they may be exposed in chronic infectious diseases.

Diabetic Acidosis

In the peripheral circulatory failure of diabetic acidosis certain features distinguish the mechanism from that underlying the capillary failure of acute infectious disease. Intercurrent infection, constipation, or improper diet decreases the patient's tolerance for carbohydrate. In the attempt of the body to utilize the fats some of these substances are incompletely oxidized and ketone substances are produced. In nature's effort to protect the body from organic acidosis the stores of sodium are depleted, with the development of mineral acidosis and dehydration. The ketosis, mineral acidosis and dehydration, along with the shock mechanism thus initiated, bring about peripheral failure and the death of the individual in the course of a relatively few hours.

The treatment of an impending or an existing peripheral failure of this type requires the prompt administration of blood plasma intravenously in quantities adequate to maintain a satisfactory blood volume. Electrolyte solution (normal saline or sixth molar sodium-lactate) must be administered also in an amount determined by the weight of the patient and the degree of acidosis present[10].

Cardiac Decompensation

In chronic myocardial insufficiency, the basic disturbance lies in the inability of the cardiac muscle to empty the heart chambers completely[2]. As a result of this failure, the thoracic veins are incompletely emptied and the negative pressure in them is replaced by a positive pressure. When the resistance in the collecting veins becomes so great that the force behind the blood in the capillary is no longer able to overcome it completely, capillary stasis must occur. Diminished return flow of blood to the heart, tissue anoxia, more incomplete emptying of the heart chambers, and still higher venous pressure develop as the process progresses. With the rising venous pressure, tissue edema occurs. This results in a further impairment of the peripheral circulation.

The mechanism underlying the peripheral failure in this instance is obviously quite different from those described in connection with the several other medical disorders. In this case the heart muscle lacks the strength to propel the normal blood volume through the vascular system and, as a result of this inability, capillary stasis and reduced return flow of blood to the heart must follow. The administration of blood plasma, which would increase the blood volume and thereby in-

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   (b) Ravdin, I. S.: The Protection of the Liver from Injury, Surgery 8:204-211 (Aug.) 1940.
10. Marsh, Frank B.: Acidosis, Physiological Basis and Treatment, South. Med. & Surg. 103:51-55 (Feb.) 1941.

crease the burden on the cardiac muscle, is obviously contra-indicated.

On the other hand, rest of the myocardium, the administration of digitalis, diuretics, vitamins and oxygen, and reduction of the salt and fluid intake are measures of proved value and are usually effective in the treatment of the disease when they are intelligently carried out.

Summary

An attempt has been made to describe the mechanism of the peripheral circulatory failure complicating several of the most frequently encountered medical diseases.

Transfusions of blood plasma and the intravenous administration of electrolytes were stressed as the most important measures in the treatment of peripheral failure associated with these disorders. The one exception to this statement lies in the treatment of the peripheral failure associated with myocardial insufficiency.

Specific sero- or chemotherapy, hydrotherapy, parenteral administration of cortin, vitamins and glucose, and oxygen inhalation are adjuvants of proven value which must be put into practice when the indications warrant their employment.

THE PRESENT DAY KNOWLEDGE OF PENICILLIN

ELIAS S. FAISON, M.D.

CHARLOTTE

The purpose of this paper is to summarize the literature on penicillin and to report 7 cases in which penicillin has been used by Charlotte doctors. I wish to make it clear in the beginning that I have had no personal experience with this drug whatsoever.

Penicillin was discovered in 1929 by Fleming, who noticed on some of his culture plates a contaminating mold surrounded by a sterile zone[1]. The organisms near the mold had been destroyed or their growth inhibited. This observation aroused Fleming's interest, and he at once began the experiments that have culminated in the isolation of penicillin. Fleming showed that this substance inhibits the growth of staphylococci, streptococci, gonococci, meningococci, diphtheria bacilli, and Welch's bacilli, but that it has practically no effect on colon bacilli, proteus and pyocyaneus bacilli, or any of the salmonella group. Neither does it have any inhibitory effect upon Hemophilus influenzae or Vibrio cholerae.

In 1940, Chain, Florey and others at Oxford University noted the remarkable therapeutic properties of penicillin[2]. They substantiated Fleming's results and proved that penicillin is relatively nontoxic. The Rockefeller Foundation arranged for Florey to visit this country in the summer of 1941. In collaboration with his colleague Heatley, and with Coghill and Moyer, Florey began work on the cultural characteristics of Penicillium notatum at the Regional Laboratory of the U. S. Department of Agriculture in Peoria, Illinois[1]. Several commercial drug companies were encouraged to undertake the production of penicillin on a large scale. This action was fostered by the Committee on Medical Research of the National Research Council. A number of commercial companies are now engaged in the production of penicillin.

In 1941 Dawson of Columbia published the first clinical reports on the use of penicillin in this country[1]. Abraham and others in England published more detailed reports on the use of penicillin in the treatment of diseases in man[3].

In June of 1942 the Committee on Chemotherapeutics of the National Research Council, under the chairmanship of Chester Keefer, was invited to conduct clinical investigations in selected hospitals. The results of these investigations have been partially reported[4]. Clinical investigation is still going on, and a number of government hospitals are now participating in the work.

Preparation

Penicillin is derived from the mold, Penicillium notatum. As a result of experimental work on culture media, the yield of penicillin has been increased fourfold. The mold grows best in a moderately acid medium. The purified drug is obtained from the culture medium by extraction with organic solvents, purification, and dehydration. The end product, however, is only approximately 10 to 15 per cent pure[4]. From 4 to 6 Oxford units

Read before the Seventh District Medical Society, Lincolnton, November 9, 1943.

1. Richards, A. N.: Penicillin: Statement Released by the Committee on Medical Research, J.A.M.A. 122:235-236 (May 22) 1943.
2. Chain, E., and others: Penicillin as a Chemotherapeutic Agent, Lancet 2:226-228 (Aug. 24) 1940.
3. Abraham, E. P. and others: Further Observations on Penicillin, Lancet 2:177-188 (Aug. 16) 1941.
4. Keefer, C. S. and others: Penicillin in the Treatment of Infections, J.A.M.A. 122:1217-1224 (Aug. 28) 1943.

are derived from 1 cc. of culture fluid. The final product contains 450 to 500 units per milligram. Penicillin is hygroscopic, and if exposed to air it rapidly loses its activity.

Pharmacology

Penicillin is absorbed very quickly and eliminated rapidly after intravenous administration[5]. Rammelkamp[5] reported that none could be found in the blood three and one half hours after an intravenous dose. Fifty-eight per cent of the injected dose can be isolated from the urine. Penicillin diffuses readily into all the tissues, but does not penetrate the subarachnoid space. Following intrathecal administration, however, it is found in the circulating blood and urine[5,6].

Penicillin is probably as nontoxic as any drug in use today[7]. Apparently the untoward reactions to the pyrogen-free drug are few[4]. They include: (1) rash, which appears in about 10 per cent of the cases and disappears rather promptly when the drug is discontinued; (2) occasional local venous thromboses at the point of injection; (3) irritation of the meninges when the drug is given to a normal person intrathecally[6b]. This irritation does not occur, apparently, in patients with an inflammatory condition of the meninges[6b].

With the advent of a new drug, we like to compare it with the most popular drug in use at that time. What advantage does penicillin have over the sulfonamides? In contrast to that of the sulfonamides, the action of penicillin is influenced very little by the number of organisms present, because, unlike the former, penicillin is bactericidal rather than merely bacteriostatic. Pus, necrotic tissue, and fluid accumulation in closed cavities do not inhibit its action. Penicillin is not as toxic to the leukocytes, and neither is it hemolytic, as are the sulfonamides at times.

Since the introduction of the sulfonamides into our armamentarium we have known that organisms may become resistant to these drugs[8]. This is also true of penicillin[9], but fortunately an organism is seldom resistant to both drugs. Theoretically, this would indicate that the action of these two drugs is fundamentally different. This fact might have a practical bearing on the treatment of drawn out diseases such as staphylococcic septicemia, unresolved pneumonia, and chronic osteomyelitis. The hemolytic streptococcus is an exception and apparently does not become penicillin fast.

Most of the Gram negative bacilli are insensitive to penicillin. This is thought to be due to the production by these organisms of an antagonistic enzyme, penicillinase.

Methods of Administration

Penicillin is dispensed in vacuum vials containing a designated number of so-called Oxford units. These units are also known as Florey units, but upon Florey's own request they will in the future be referred to only as Oxford units. An Oxford unit may be defined as "that amount of penicillin which dissolved in 50 cc. of meat extract broth just inhibits completely the growth of Staphylococcus aureus." All routes of administration have been tried. The oral route has been rejected, since the drug is destroyed by the gastric juice. Duodenal instillation by intubation has been shown to be successful. The continuous intravenous drip method insures a rather constant drug blood level. Because of the not infrequent development of thrombophlebitis, however, this method is being replaced by the intramuscular route. For intramuscular injection the drug should be diluted with normal saline rather than distilled water. Absorption is slower when the drug is given subcutaneously. The rectal route is impractical because of the production of penicillinase by the coliform group of organisms. Hence, of these methods, the intramuscular route is preferable.

Dosage

Penicillin is quite soluble in water, and as much as 1,000,000 units can be dissolved in 1 cc. Owing to the many factors involved, the dosage is today more or less on a trial and error basis. As data are completed these

5. Rammelkamp, C. H. and Keefer, C. S.: The Absorption, Excretion and Distribution of Penicillin, J. Clin. Investigation 22:425-437 (May) 1943.
6. (a) Rammelkamp, C. H. and Bradley, S. E.: Excretion of Penicillin in Man, Proc. Soc. Exper. Biol. & Med. 53:30-32 (May) 1943.
(b) Rammelkamp, C. H. and Keefer, C. S.: Absorption, Excretion and Toxicity of Penicillin Administered by Intrathecal Injection, Am. J. M. Sc. 205:342-350 (Mar.) 1943.
7. Herrell, W. E. and Heilman, Dorothy: Tissue Culture Studies on Cytotoxicity of Bactericidal Agents; Effects of Gramicidin, Tyrocidine, and Penicillin on Cultures of Mammalian Lymph Node, Am. J. M. Sc. 205:157-162 (Feb.) 1943.
8. Herrell, W. E., Cook, E. N., and Thompson, Luther: Use of Penicillin in Sulfonamide Resistant Gonorrheal Infections, J.A.M.A. 122:289-292 (May 29) 1943.
9. McKee, C. M. and Houck, C. L.: Induced Resistance to Penicillin of Cultures of Staphylococci, Pneumococci and Streptococci, Proc. Soc. Exper. Biol. & Med. 53:33-34 (May) 1943.

uncertain factors are, of course, being eliminated. Generally speaking the dosage employed today varies between 30,000 and 100,000 units daily. To maintain an adequate blood level the drug should be given intramuscularly about every three hours, and to initiate a high level promptly the first dose should be given intravenously.

Indications for Its Use

What, then, are the indications and contraindications for the use of this drug? In a broad sense it is indicated in all infections with Gram positive organisms and Gram negative cocci, whether localized or generalized. It is useless in conditions caused by Gram negative bacilli. It is, therefore, desirable prior to the administration of penicillin to determine bacteriologically the type of organism present.

Of 129 cases of gonorrhea treated with penicillin by Keefer[4] and the collaborators in various hospitals all patients recovered and 125 were bacteriologically negative within nine to forty-eight hours. Penicillin has also been used in the treatment of the primary stage of syphilis, with encouraging results.

Actinomycosis reacts favorably to penicillin and the early reports indicate that the mortality rate in this disease will be substantially lowered[4]. The tetanus bacillus is likewise sensitive, and although penicillin will not neutralize the toxins that have already been elaborated, it will prevent the production of more toxins. One wonders if it will finally take the place of antitoxin as a prophylactic agent.

The reports on the use of penicillin in pneumonia have been a bit disappointing, in that it has not reduced the mortality below that obtained with the sulfonamides[4]. More reports, however, will be necessary before a final opinion on this subject can be formed.

Report of Cases

As far as I have been able to determine penicillin has been used in Charlotte in 7 cases. One case of staphylococcic septicemia was treated by Dr. James Alexander, and by his permission the case history is presented.

Case 1. The patient, R. P., a white male, was admitted to the Charlotte Memorial Hospital on the urological service of Drs. McKay and McKay, on Sept. 10, 1943. Upon admission he had a low grade fever which was thought to be due to urinary infection. His past history revealed that he had suffered a left hemiplegia, and he still showed some residuum from that. There was some arteriosclerosis and cardiac hypertrophy. His blood pressure was 144 systolic, 80 diastolic. The nonprotein nitrogen was slightly elevated. A diagnosis of benign hypertrophy of the prostate was made. On Septmeber 13 a suprapubic cystotomy was performed. The urinary infection was treated with sulfadiazine and he became afebrile. Eight days later a second stage prostatectomy was done.

The postoperative course was uneventful until October 10, when the patient developed an unexplained fever. Blood cultures were positive for Staphylococcus aureus of the nonhemolytic type. Large doses of sulfadiazine were given, and the blood level ranged from 12 to 23 mg. per 100 cc. He continued a septic type temperature, ranging from 101 to 103 F. On October 23 his blood culture showed 223 colonies per cubic centimeter of blood. At 10 a.m. on this day penicillin was started intravenously. He was given 20,000 units immediately and 5,000 units per hour by the drip method. The total twenty-four hour dose amounted to 135,000 units. His temperature returned to normal and the blood culture made the following day was negative. On the second day he received 75,000 units. On this day he developed clinical and x-ray evidence of bilateral bronchopneumonia. He was, however, afebrile. From October 23 to October 30 he received a total dosage of 480,000 units of penicillin. He remained afebrile from October 23 to October 27, but on October 28 he had a chill, and a blood culture made at this time was positive. A systolic murmur over the aortic region was noted on October 29. On November 1 he developed a thrombophlebitis in the right leg, and on November 5 he expired. An autopsy by Dr. Paul Kimmelstiel revealed an ulcerative endocarditis of the tricuspid valve, numerous small abscesses in the lungs, and thrombosis of the right femoral vein. Drs. Alexander and Kimmelstiel feel that the endocarditis was acting as a focus and that the infection, therefore, could not be eliminated.

Dr. J. S. Gaul has treated 6 cases of osteomyelitis with penicillin and has given me permission to present these case records. All

the patients had previously been treated with sulfonamides

Case 2. D. M., aged 44, sustained a compound comminuted fracture of the right tibia in December, 1939. Five operations were performed, and on two occasions maggots were used. On September 17, 1943, he sustained another fracture through the old osteomyelitic area. On September 23 he received 5,000 units of penicillin intramuscularly every two hours. On the following days he was given 10,000 units every four hours until he had received a total of 120,000 units. The culture from the wound before treatment showed hemolytic Staphylococcus aureus. At the end of forty-eight hours his wound was clean. A culture made at the end of seventy-two hours was negative, and cultures have remained negative since. The wound is filling in, and there is merely a slight amount of serous drainage.

Case 3. H. M., a boy 14 years of age, fell from a tree on July 10, 1943, and sustained a compound fracture of the right radius. Six inches of this bone was buried in the ground. The bone was thoroughly cleaned and put back in place.

On September 10 he developed a high temperature and marked edema of the right forearm to the elbow. A blood culture was positive for nonhemolytic Staphylococcus aureus. The wound was opened but only serum was obtained. The next day 20,000 units of penicillin were given intravenously over a period of three and a half hours. His temperature dropped from 105 to 100 F. The following day two doses of 10,000 units each were given. The fourth day 5,000 units were given intramuscularly on four occasions at intervals of four hours. His temperature reached normal on the fourth day and his blood culture was negative. An x-ray showed destruction of the end of the radius. Three weeks later four inches of the radius was removed, but the periosteum was left intact. Dr. Gaul tells me that this is the most rapid sequestration that he has ever encountered. At the time of writing the wound has not completely healed, but is without drainage.

Case 4. For eight years J. D., aged 32, had a metastatic osteomyelitis which involved on different occasions both humeri, the right mandible, both tibias, and the left radius. All these foci had been drained, and all had healed except the left radius, which continued to drain after sequestrectomy. Just as another acute involvement of the right tibia was beginning, 20,000 units of penicillin were given intravenously. The second day 40,000 units were given intramuscularly. The lesion in the tibia disappeared without an incision. The lesion in the radius has healed. The culture from the wound showed Staphylococcus aureus.

Case 5. On October 7, A. H., aged 14, sustained an injury to the back. In forty-eight hours he had a temperature of 104 F. His blood culture was negative. On October 23, 1 cc. of pus was aspirated from the right side of the fifth lumbar vertebra. There was x-ray evidence of osteomyelitis of the body of the fifth lumbar vertebra. The culture showed a hemolytic Staphylococcus aureus. In twelve hours the patient was given 100,000 units of penicillin intravenously by the drip method; on the second day 40,000 units; and on the third day 20,000 units. His fever fell by lysis and disappeared on the fourth day. Since then he has been symptomatically well.

Case 6. This patient was a boy of 16 who had had osteomyelitis of the right humerus for seven years. Four operations had been done. He was admitted to the hospital with four profusely discharging sinuses. Culture from the wounds showed a nonhemolytic Staphylococcus aureus. His blood culture was negative. The x-ray showed a moth-eaten humerus but no sequestration. His temperature was 103 F. He was given intravenously 40,000 units of penicillin on the first day, 40,000 on the second day, and 20,000 on the third, fourth, and fifth days. His temperature dropped by lysis to normal in one week. His leukocytosis disappeared and he left the hospital in two weeks with the sinuses healed.

Case 7. I. W., aged 18, sustained an injury of the right sacro-iliac area while playing football three years ago. In a few days he developed a high temperature with leukocytosis and edema of the right sacro-iliac region. Three operations were performed during this period.

On September 27, 1943, he was admitted to a hospital in Charlotte. At this time there was x-ray evidence of osteomyelitis with sequestration in the ilium. A culture from the draining sinus showed Staphylococcus aureus. Sulfathiazole seemed to have no effect upon the patient's temperature. He was kept in the hospital for a month, during

which time the wound discharged profusely and he ran a septic temperature. On October 27 he was given 100,000 units of penicillin intravenously, and three days later the wound was dry, his temperature was normal, and the leukocytosis had disappeared.

POSTPARTUM STERILIZATION: INDICATIONS AND ADVANTAGES

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and
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WINSTON-SALEM

The danger of pregnancy complicating certain constitutional diseases has long been recognized. Women with such diseases are advised against becoming pregnant, and termination of pregnancy is usually necessary if they conceive. A large number of preventable maternal deaths occur in this group. The serious risks involved in a therapeutic abortion or uninterrupted pregnancy in such women can be avoided by the judicious use of the sterilization operation. Contrary to general opinion, sterilization can be a simple procedure with little or no associated morbidity or mortality.

Indications

In a previous communication[1], we have pointed out the increasing use of elective sterilization in the management of patients with general constitutional diseases which are seriously affected by pregnancy. The medical profession as a whole does not agree on the conditions which warrant the prevention of further pregnancies by sterilization. "In general, it may be said that indications for the prevention of pregnancy are more flexible than they are for its termination by therapeutic abortion."[2]

Toxemias

Toxemia of pregnancy is the leading cause of maternal deaths in the southeastern states, but not all conditions predisposing to toxemia are absolute indications for sterilization. The toxemias of pregnancy have been classified by the American Committee on Maternal Health as follows[3]:

I. *Hypertensive disease.* The common types of hypertensive cardiovascular disease are arteriosclerotic hypertensive cardiovascular disease and essential hypertension. Neither of these conditions is frequent in women of childbearing age, but the latter type is more commonly encountered. Hypertensive disease is frequently not recognized unless the patient is seen either before conception or early in her pregnancy. The young woman with a systolic blood pressure of 150 or above faces a serious hazard in pregnancy. She should be watched very closely, for her chance of completing pregnancy with a healthy child is considerably reduced. Her condition is usually associated with no physical findings other than the hypertension. The urine is usually normal. One must be careful to distinguish these patients from those whose blood pressure on their initial visit is considerably elevated through excitement and fear of examination. Frequently the initial blood pressure determination is abnormally high, but the level promptly returns to normal after a period of rest and reassurance by the physician.

II. *Renal disease.* In clear-cut cases of chronic nephritis, sterilization is indicated. Even patients with very mild nephritis, whose blood pressure may be only 140 systolic, 90 diastolic and in whom little or no urinary change is evident, should be strongly warned against becoming pregnant and should be permitted to have a sterilization operation if they wish it. The patient who is so desirous of a child that she is willing to take the risks involved should be given a clear understanding of the probability of serious complications during her pregnancy, with increased damage to her kidney and a decrease in life expectancy.

III. *Preeclampsia.* Preeclamptic toxemia is characterized by a rather abrupt rise in blood pressure, usually in the third trimester of pregnancy, which is usually accompanied by albuminuria. The blood pressure returns to normal within a short time after termination of pregnancy. There is little if any permanent damage to the kidney. This condition can be differentiated from cardiovascular hypertension and renal disease only if the patient's blood pressure before the onset

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From the Department of Obstetrics and Gynecology, Bowman Gray School of Medicine of Wake Forest College, and the North Carolina Baptist Hospital, Winston-Salem.

1. Lock, F. R., Forman, R. C., and Webster, N. M.: Postpartum Sterilizations: Indications and Results, South. M. J. 36:138-145 (Feb.) 1943.
2. Birch, W. G.: Postpartum Sterilization, J. Michigan M. Soc. 40:535-538 (July) 1941.
3. DeLee, J. B. and Greenhill, J. P.: The Principles and Practice of Obstetrics, ed. 8, Philadelphia, W. B. Saunders Company, 1943, p. 347.

of pregnancy or in early pregnancy is known, and if the blood pressure returns to a normal level during the postpartum period. Inasmuch as it causes no permanent damage to the kidney, preeclampsia is not an indication for sterilization.

IV. *Eclampsia.* Eclampsia may result from the exacerbation of chronic nephritis or hypertensive cardiovascular disease which is brought on by pregnancy, but it most frequently occurs on a basis of pure toxemia of pregnancy. If the condition is the result of a pure toxemia of pregnancy, it seldom recurs and the symptoms disappear after delivery. Under these circumstances it is not an indication for sterilization. When eclampsia results from chronic nephritis or hypertensive cardiovascular disease, it is a definite indication for sterilization.

V. *Vomiting of pregnancy.* Hyperemesis gravidarum is not an indication for sterilization.

VI. *Unclassified.* The American Committee on Maternal Health includes in this group numerous conditions such as acute yellow atrophy of the liver, acute nephritis, nephroses, and so forth. These conditions must be considered separately and individual decisions made in each case.

Other Conditions in Which Pregnancy May Be Dangerous

I. *Tuberculosis.* A phthisiologist should always be consulted in making a decision about sterilization of tuberculous patients. In general, it may be said that in the young woman with early tuberculosis, excellent healing may occur and subsequent pregnancies be tolerated very well. Chronic active tuberculous lesions call for sterilization. Extrapulmonary tuberculosis is usually an indication for sterilization.

II. *Cardiac disease.* Evaluation of the cardiac patient must be made on a functional rather than an anatomical basis. In general, any non-gravid woman who has had a break in cardiac compensation under ordinary activity should be sterilized. A non-gravid patient who has had a break in compensation only after extreme physical exertion may occasionally be permitted to go through pregnancy. Regardless of how well she has done in the past, pregnancy is dangerous to such a patient, and she should be carefully followed, with the assistance of a cardiologist.

III. *Constitutional diseases.* The serious constitutional diseases are usually associated with infertility. If a patient with such a condition does go through a pregnancy, however, the question of postpartum sterilization should be left up to her. Those women having non-hereditary conditions such as blindness and crippling deformities should be permitted to have a sterilization operation if they wish it, but it should not be urged by the obstetrician.

IV. *Neurological and psychiatric conditions.* The sterilization of mentally deficient individuals and persons of unsound mind is covered by the existing laws, and must be ordered by the State Eugenics Board.

V. *Hereditary diseases.* The hereditary conditions can be divided into two groups: dominant and recessive. Fifty per cent of the children of a person who has a dominant hereditary trait, or in whose immediate family such a trait exists, will inherit that characteristic. In a recent study of ten North Carolina counties, Drs. Allan and Herndon found 115 cases of retinitis pigmentosa[4]. One half of the children of the people in this group will also be blind. The patient in whose family there is a serious dominant hereditary disease should not become pregnant. Among these diseases are aniridia, Huntington's chorea, retinitis pigmentosa, hemophilia, and others. Those women who inherited a serious recessive condition need be sterilized only if they marry a person who also has the same recessive trait.

VI. *Multiparity.* Eastman[5] has called attention to the marked increase in maternal mortality in the "grande multipara". He analyzed 191 maternal deaths occurring in 45,514 deliveries. There was a gross maternal mortality rate of 4.20 per thousand live births. In the lower parity brackets, the maternal death rate ranged from 3.55 to 3.78 per thousand. It soared to 11.73 in patients who had had nine or more children. The increasing risk to the mother with the responsibilities of a large family should make sterilization an optional procedure in this group.

Advantages

In a previous paper[1], we have reported 59 cases in which postpartum sterilization was done. In a majority of this group, the procedure was carried out on the fourth or fifth postpartum day, although it may be

4. Herndon, C. Nash: Personal communication.
5. Eastman, N. J.: Hazards of Pregnancy and Labor in "Grande Multipara", N. Y. State J. Med. 40:1708-1712 (Dec. 1) 1940.

done as early as the first and as late as the eighth postpartum day. Morbidity in these patients was 8.5 per cent, which does not exceed the morbidity in a group of patients who had normal deliveries which were not followed by an operative procedure. The average postoperative stay was seven days, and no patient in this series remained in the hospital longer because of the procedure. Postpartum sterilization was done under local anesthesia and by a safe and technically simple operative procedure[1]. Its advantages over interval sterilization procedures are that a second hospitalization is unnecessary, and that the possibility of a pregnancy's being present at the time of operation is eliminated.

The patients in this series were carefully selected, as all such patients should be. The operation should not be performed in a patient who has had a rise in temperature above 100.4 F. or a persistent pulse rate of 100 or above. Written permission from both the husband and wife must always be obtained, and they should fully understand what the results of the procedure will be. The only effect of this operation has been the elimination of conception; there has been no change in menstrual cycle or libido in any of the group. Our patients are clearly informed that their decision to be sterilized is irrevocable once the procedure is carried out, and that reconstruction of the tubes is impossible.

THUMBNAIL SKETCHES OF EMINENT PHYSICIANS

JOSIAH C. TRENT, M.D., *Editor*

DURHAM

III

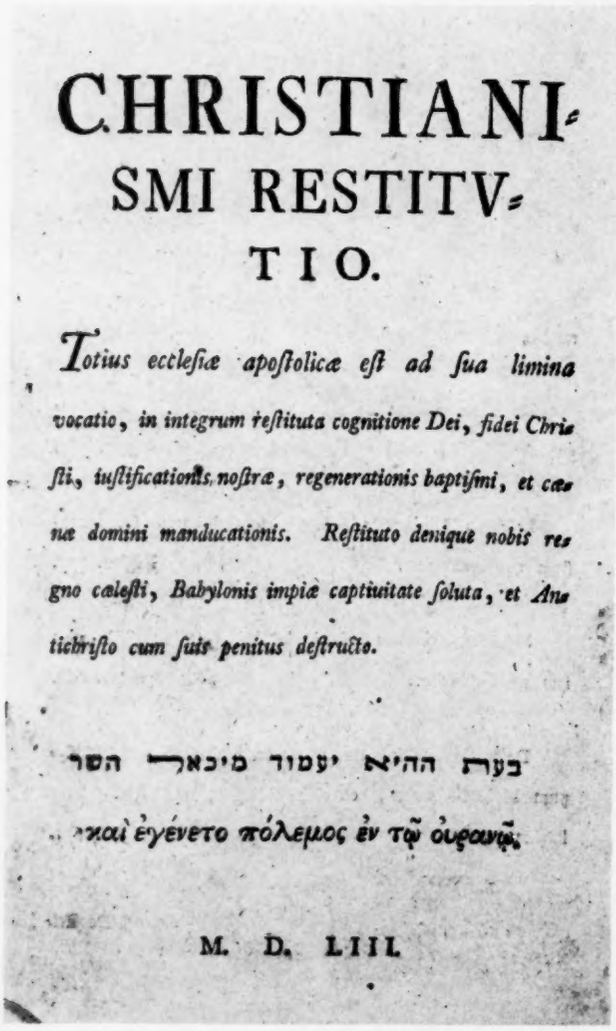
MIGUEL SERVETUS

On the twenty-seventh day of October, 1553, a scene of the most barbarous cruelty was enacted in the Swiss town of Geneva. At 11 o'clock of this terrible day a prisoner, dressed in befouled rags, his beard tangled, his visage dirty and wasted, tottered beneath the weight of his prison chains as his captors led him to the Town Hall, where he was forced to kneel while his dreadful sentence was read aloud to the assembled populace. "We condemn thee to be burned alive, and with thee thy printed book, until thy body is consumed to ashes." The doomed and broken man crawled nearer to the municipal authorities and begged that he might be decapitated instead of dying the horrible death of burning by slow fire. He was told that if he would recant his "blasphemy directed against the Trinity" he might be executed in some less dreadful way, but the fanatical and stubborn prisoner refused. As he was led to the place of execution he was harangued by disputatious theologians, who implored him to recant, but his only reply was to implore God to be merciful to his accuser.

When the flames rose around him he uttered a cry so dreadful that many of the onlookers turned their eyes away from the sight. The shrieks of agony grew louder and louder until at length came a last imploring scream: "Jesus, Son of the everlasting God, have pity on me!"

The victim was Miguel Servetus, a Spanish physician, discoverer of the lesser, or pulmonary circulation of the blood; and the accuser who hounded him to such a horrible death was John Calvin. Thus Miguel Servetus became the first martyr to Protestant fanaticism. Many thousands of "heretics" had fallen victim to the intolerance and inhumanity of Catholicism, but it remained for John Calvin, now revered as a saint, to cover with shame the reformers of the Church of Rome.

Miguel Servetus was one of those curious, restless minds of the Renaissance who had taken all knowledge to be his province, studying philosophy, medicine and theology, although never acquiring a thorough knowledge of any of them. He was a vain, disputatious man, willing always to join in quarrels over religious dogma and eager to show the leaders of the Reformation the er-



CHRISTIANI-
SMI RESTITV-
TIO.

Totius eccleſiæ apoſtolicæ eſt ad ſua limina vocatio, in integrum reſtituta cognitione Dei, fidei Chriſti, iuſtificationis noſtræ, regenerationis baptiſmi, et cœnæ domini manducationis. Reſtituto denique nobis regno cæleſti, Babylonis impiæ captiuitate ſoluta, et Antichriſto cum ſuis penitus deſtructo.

בעת ההיא יעמוד מיכאל הסר

καὶ ἐγένετο πόλεμος ἐν τῷ οὐρανῷ.

M. D. LIII.

Title page of the rare Nuremburg reprint (1790) of Servetus' "Christianismi Restitutio", first published in 1553, in which the pulmonary circulation of the blood is described for the first time. (Editor's collection.)

rors of their ecclesiastical ways. At the famous Council of Nicaea the doctrine of the Trinity had been enunciated in language that rendered that mystic concept even more obscure, and Servetus published in 1531 a book entitled "De Trinitatis Erroribus", which, since it attacked something that no theologian understood, aroused all theologians, both Protestant and Catholic, to fury. Servetus fled for his life to Paris, where he obtained work as a proof-reader. While revising the proofs of medical books he decided to study medicine, and he worked beside the great Vesalius in the preparation of dissections. It was as a result of this training that he made his brilliant discovery of the pulmonary circulation.

Curiously enough, he published his discovery in one of his dissertations on religion, entitled "Christianismi Restitutio", and never pursued the subject further. Part of his very exact and clear description follows: "This communication, however, does not take place through the septum, partition, or midwall of the heart, as commonly believed, but by another admirable contrivance, the blood being transmitted from the pulmonary artery to the pulmonary vein, by a lengthened passage through the lungs, in the course of which it is elaborated and becomes of a crimson colour. Mingled with the inspired air in this passage, and freed from fuliginous vapours by the act of expiration, the mixture being now complete in every respect, and the blood become fit dwelling-place of the vital spirit, it is finally attracted by the diastole, and reaches the left ventricle of the heart."

After many vicissitudes, he returned, in his restless way, to theological disputations, especially upon the error of the doctrine of the Trinity, and had the temerity to beard the powerful religious dictator, John Calvin, in his Geneva den, with the direful result narrated above. In John Calvin he met an antagonist, more stubborn and fanatical than himself, who exemplified in his character the exact opposite of the kindly teachings of Christ.

The murder of Servetus by Calvin horrified the Protestant world and, at a later date, Calvin denied that he was the instigator of his death. The evidence is clear, however, that Servetus was a victim of Calvin's dictatorial vanity and cold-blooded fanaticism.

F. M. HANES, M.D.

Food refining and food processing.—The polishing of rice, the milling of the germ and much of the protein, vitamins and inorganic salts out of such foods as wheat and other grains, corn, etc., are food practices of the gravest concern to health. Purification and hydrogenation of animal and vegetable fats may take considerable if not all of the fat-soluble vitamins out of these fats. Modern preservation of food such as canning, freezing or dehydration is necessary in modern urbanization. Some food values are diminished, unavoidably, by these processes. Cooking, freezing and packing undoubtedly saves man from infectious disease, but some food values are lost. It is a question of balance of benefits. Fortunately we do still eat raw fruits and some raw vegetables. The latter could and should be greatly extended.—Carlson, A. J.: Some Obstacles in the Path Towards an Optimum Nutrition, Science 97:388 (April 30) 1943.

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MARCH, 1944

A FOUR-YEAR MEDICAL SCHOOL FOR THE UNIVERSITY OF NORTH CAROLINA

On January 31 Governor Broughton recommended to the Board of Trustees of the University of North Carolina that the University's two-year medical school be expanded into a four-year school; that an adequate hospital, with not less than 600 and preferably 1000 beds, be erected on the University grounds; and that smaller hospitals, to serve as local medical centers, be established "in strategic regions of the state for the hospitalization of those in need of medical care without the means to provide for that care."

Before this recommendation was offered, a committee of alumni and friends of the University had considered the advisability of such a step, and had approved it in a statement to the governor. The committee was composed of Dr. James W. Vernon, President of the Medical Society of the State of North Carolina; Dr. Paul F. Whitaker, President-Elect; Drs. Donnell Cobb, Hubert Haywood, and Paul McCain, past presidents; Dr. W. Reece Berryhill, Dean of the Medical School of the University; and Drs. William Coppridge and Hamilton McKay. In their statement to Governor Broughton, this committee called attention to the fact that, notwithstanding the magnificent contributions of the Duke Foundation, North Carolina still is near the foot of the list in proportionate number of hospital beds, and that the ratio of physicians to population is little more than half the national average.

As Dean W. C. Davison, of the Duke University School of Medicine, pointed out a few years ago[1], "The South will not get its physicians by migration; the students should be Southern, and to get country doctors it must be possible for students from the rural counties to study medicine."

Thanks to the clear vision and foresight of Dr. Isaac Manning, a former Dean of the University of North Carolina School of Medicine, the present agitation over the cost of medical care fomented by the advocates of political medicine has been felt less in North Carolina than in most other states. The widespread acceptance of the principle of voluntary hospital insurance, however, has so increased the burden upon the hospitals in the state that most of them are constantly overcrowded. The proposal of the Committee, which was incorporated in Governor Broughton's recommendation, that subsidiary hospitals be placed where they are most needed, should alleviate this condition.

There are certain dangers in this proposal, however, which should be recognized and guarded against. The first is the undue influence of political pressure which may be exerted in the location of the subsidiary hospitals, in the selection of staff members, and in the admission of patients. A second danger is that the expense of building and maintaining these hospitals may be too great a drain upon the state's financial resources. Certainly, when almost every undertaking establishment in the state maintains its own ambulance or fleet of ambulances, it should not be necessary for the state to provide a system of ambulances and buses to transport patients. Finally, there is danger that if, as

suggested by the governor, federal funds are given to build either the central hospital or any of the subsidiary hospitals, a measure of federal control may follow. If, however, the plan is to be, as was stated in the governor's recommendation, "under the general direction of and with the enthusiastic support of the medical profession," it should, to some extent at least, be protected from these dangers.

The University's four year school, joining hands with the Duke University School of Medicine and the Bowman Gray School of Medicine of Wake Forest College, should, within a few years, begin to supply the state with adequately trained doctors in numbers gradually approaching the desirable ratio. Already the number of patients who leave the state for treatment in distant medical centers is yearly growing smaller and smaller. With such an addition to the medical facilities of the state as is envisioned here, the few who go out of the state for treatment will be reduced to those individuals to whom distant pastures always look greenest.

The Board of Trustees of the University unanimously voted to accept Governor Broughton's recommendation, and the governor has appointed a commission of twenty-nine members to study the proposed program. To Governor Broughton, Dean Berryhill, and the many alumni of the University who are working to bring about the consummation of their vision, the NORTH CAROLINA MEDICAL JOURNAL extends its very best wishes.

1. Davison, W. C.: Opportunities in the Practice of Medicine, J.A.M.A. 115:2227-2232 (Dec. 21) 1940.

POLITICAL MEDICINE IN AUSTRALIA AND NEW ZEALAND

A significant editorial appeared in the *Journal of the American Medical Association* for January 29, under the heading, "Australian Government Accepts Medical Advice". It is based upon the sixth interim report on a comprehensive health scheme, issued by the Parliamentary Joint Committee on Social Security. The original scheme "called for a whole time salaried medical service with district organizations . . . and integration of all health services." Apparently it might have served as a model for the Wagner-Murray-Dingell Bill. The gist of the report by the Australian Parliamentary Committee is contained in the statement that "The committee is impressed by the existing widespread opposition to the proclamation of this act and concludes from it that the scheme there suggested is unsuitable as a permanent basis for the people of Australia." Of paramount importance is the following paragraph: "While, therefore, there is pronounced opposition to the scheme outlined by the National Health and Medical Research Council which visualizes a system of governmental control of all health services, there is considerably less opposition to such a service if control is vested largely in the medical profession through an independent body . . . removed from political control. Indeed, upon this aspect of administration there is almost complete unanimity. *Such freedom from political control is essential for the success of any scheme.*" (Italics ours.)

Messrs. Wagner, Murray and Dingell, and their advisors, might well ponder this report.

A planning committee has also been set up in New Zealand[1] "to study the problems arising from the program of free medical service which has now been in existence two years." Here, too, the scheme is not going very well. According to reports carried by the New Zealand papers, many communities are facing a serious shortage of doctors. Apparently the scheme has not improved the standards of medical ethics, for there are reports that some doctors are profiteering at the expense of the social security fund. A past president of the medical association "is said to have described the situation as 'an awful racket.'" "Newspaper reports indicated that the physicians feel that a reasonable scheme can be operated only if political control is avoided."

Those who think that government control of medical practice would miraculously insure a uniform distribution of medical care, and that eliminating the competition of private practice would raise medical ethics should profit by New Zealand's experience.

1. State Medicine Waning in New Zealand, Medical News, J.A.M.A. 124:452 (Feb. 12) 1944.

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FOR AUTHORS ONLY

This editorial is written for the exclusive benefit of those who are preparing papers for presentation at the State Society meeting in May, or who may, at some future date, submit articles for publication in this JOURNAL.

The attention of the former group is first called to two statements in the By-Laws of the Medical Society of the State of North Carolina: (1) "All papers read before the Society shall be the property of the Society" (Section 4, Chapter X); and (2) "No paper shall be received by or read before this Society that has been presented to any other society, excepting only a component society or District Society of this State; or that has been offered for publication in any journal. In the case of any paper accepted, the author is supposed to have invested with the Society all rights to its ownership" (Section 4, Chapter XI). Apparently these rules of the Society are not generally known, and are not made clear to those who are asked to participate in the program of the annual meeting.

For the benefit of both groups, an editorial on "The Preparation of Manuscripts", which appeared in the first volume of the NORTH CAROLINA MEDICAL JOURNAL[1], has been refurbished and is reproduced below. Most of the suggestions contained in it are taken from Dr. Fishbein's book, MEDICAL WRITING[2], which is heartily recommended to anyone attempting to prepare a medical paper.

Manuscripts should be typed on standard size typewriter paper, *double-spaced*, with liberal margins. Single-spaced manuscripts will be returned to the author for re-typing. The title of the paper, the author's name, his degrees, and his address should be given at the top of the first page. If the paper is from a medical school or hospital, the full name of the institution and the department should be given in a footnote, along with the section or society to which the paper is presented, and the date of presentation.

References to books and articles, and any footnotes of the author's *should be indicated by consecutive numerals throughout the text* and then typed, double-spaced, on a separate page at the end of the manuscript. The bibliographic form and abbreviations used in the *Journal of the American Medical Association* and in the *Index Medicus* should be followed exactly. References should always be given to articles from which a direct quotation is taken or which are used as authority for statement of a fact not generally known. Books and articles not referred to in the paper should not be included, unless a complete bibliography of the subject is given. Both the author and the editorial staff will be saved a great deal of correspondence and trouble if these directions are followed.

Although it should not be necessary to state that all direct quotations from other sources should be put in quotation marks, and that *only* direct quotations, in the exact words of the original, should have quotation marks around them, experience has taught that all too often this first rule of literary etiquette is violated. If any words in a quotation are omitted, this should be indicated by a series of dots; if additions are necessary, they should be put in brackets; and *no other changes* should be made within quotation marks.

Tabular matter and legends for illustrations should be typed on separate sheets of paper. The NORTH CAROLINA MEDICAL JOURNAL, like most state journals, has had to adopt the policy of asking authors to pay for their cuts. It will save expense to the author if he will omit all illustrations which do not add directly to the value of the paper.

Case reports should be written with the same care that is given to the rest of the article. Dr. Fishbein says: "A case report should tell its story in clear, straightforward narrative style. It should not be transcribed word for word from original records that were hastily jotted down at the time the various events occurred; the jerky, telegraphic style of the record sheet may result in actual padding." All irrelevant findings should be omitted, and the tenses should be kept consistent. Care should be taken to avoid confusion of dates and to make the sequence of events clear.

When the paper has been typed, the author should re-read it carefully, checking on spelling and grammar. Even the most efficient secretary may make her boss appear to be an ignoramus by a few strategically placed typographical errors. Corrections (if they are not too many) may be written between the lines in ink, as legibly as possible.

By following the simple rules given above, any writer can greatly increase his popularity with the editorial staff of a medical journal. The editorial board will be "pleased to accept" his articles with greater alacrity and the assistant editor, in particular, will remember him with praise.

1. The Preparation of Manuscripts, North Carolina M. J. 1:161 (March) 1940.
2. Fishbein, Morris: Medical Writing, Chicago, American Medical Association, 1938.

CASE REPORTS

CLINICO-PATHOLOGICAL CONFERENCE

BOWMAN GRAY SCHOOL OF MEDICINE OF WAKE FOREST COLLEGE

Case Summary

A 37 year old machinist was admitted to the North Carolina Baptist Hospital on November 1, 1943. He stated that he had had pneumonia seven months previously. He was sick for about two weeks at this time and apparently recovered. A little later he again developed fever, sweats, malaise and cough, and began to lose weight. He had no chest pain. On October 20, 1943, the patient was examined at a tuberculosis sanatorium. Fluoroscopy and films of the chest showed questionable cardiac enlargement to the left and slight widening of the aorta. The lungs were clear. The patient was admitted to another hospital, and on October 27 50 cc. of slightly turbid fluid was aspirated from the left chest. A second thoracentesis yielded no fluid. A report from the hospital states that a little later embolic phenomena developed, murmurs became audible, and the diagnosis of subacute bacterial endocarditis was made. The patient stated that he improved following the admission to the other hospital, but that he had not been well since that time. He had a persistent cough productive of sputum which was most abundant in the mornings. He stated that he coughed up about a cupful per day. The sputum was not foul. The patient had lost a great deal of weight. He had had some pain and tenderness about the left costal margin, not definitely related to respiration. There was no history of rheumatic fever. The patient gave a vague history of a positive blood test twenty-one years ago, following which he was given injections in his arm for about four months.

Physical examination. The patient was an acutely and chronically ill man who obviously had lost a great deal of weight. The skin was hot and dry with a few scattered petechiae. A few small lymph nodes were palpable. The mucous membranes were a little pale. There were several fresh petechial hemorrhages in both conjunctivae. The pupils were equal and reacted to light and accommodation. The external ocular movements were normal. Examination of the fundi was negative, as was examination of the ears, nose, and pharynx. The neck was not stiff; the trachea was in the midline; and the thyroid was not palpable. Chest expansion was equal. There was some impairment of percussion with some suppression of breath sounds at the left base posteriorly, extending into the axilla. No changes in voice sounds and no rales were heard. There was only slight cardiac enlargement. The apical impulse was quite prominent and forceful. There was also fairly marked increase in precordial pulsations. The rhythm was regular, the rate rapid. The second pulmonic sound was louder than the second aortic. A very rough grade III systolic murmur could be heard all over the precordium at the apex. Later this murmur became very loud. In the aortic area and down the left border of the sternum there was a soft, blowing grade II early diastolic murmur. Peripheral pulses were full. The blood pressure was 120 systolic, 60 diastolic. The abdomen was soft and not tender; no organs or masses were palpable. There was no edema or lesions of the extremities. The fingers showed early clubbing. Neurological examination was negative.

Accessory clinical findings. The urinalysis showed a specific gravity of 1.020, an acid reaction, no albumin and a trace of sugar. The microscopic examination showed a few white blood cells and an occasional granular cast. Numerous subsequent examinations revealed the same findings, except for the appearance of a few red blood cells. A blood count showed 10.5 Gm. of hemoglobin, 4,680,000 red blood cells and 18,300 white blood cells. The differential count and blood smear were normal, except for an increase in nonsegmented polymorphonuclears and hypochromia of the red blood cells. The platelet count was 687,000. The leukocyte count decreased with therapy but remained elevated. Anemia increased but was partially corrected by transfusions. The nonprotein nitrogen was 29 mg. per 100 cc. Blood Kahn tests were positive on two occasions. Lumbar puncture revealed clear fluid, with normal pressure and dynamics; the Pandy test was negative, the cell count showed 11 lymphocytes and 70 red blood cells, and the Kahn test was negative. Sputum was thin and greenish and revealed no acid-fast or other predominating organism. A chest plate made

on admission showed hazy bronchopneumonic infiltration in the left lower lobe. The left costrophrenic sinus was obliterated by pleural thickening. The heart was not described. An electrocardiogram was normal. Numerous blood cultures showed alpha streptococci.

Course in the Hospital. The temperature spiked to 102-103 F. daily. On the second day in the hospital the patient suddenly developed rather severe pain in the right flank and lumbar region which subsided after a few days. On the eighth hospital day he was given 10 Gm. of sodium sulfamerazine intravenously, and during most of the remainder of his time in the hospital was given 6 Gm. of sulfamerazine by mouth daily. After the drug was started, he was given 105 r units of x-ray over the heart anteriorly on three successive days. He continued to have spiking fever and developed numerous petechiae and ecchymotic areas in the tongue, pharynx, other mucous membranes and skin. These cleared in about a week, the fever decreased and the patient appeared to be better. Subsequently the temperature began to spike again. He complained intermittently of pain in the costovertebral angles. On the thirty-sixth hospital day he became nauseated and vomited and then complained of a very severe precordial pain which radiated down the left arm. It was not entirely relieved by ½ grain of morphine given over a two hour period, and it lasted seven to eight hours. It was not definitely related to respiration, but the patient could not describe it accurately. An electrocardiogram showed no significant changes since the previous record.

On the forty-sixth hospital day the patient began to look much worse. He complained of shortness of breath. Respiration was rapid, and there was dullness at the left lung base and rales in the right base. On the following day there were rales throughout the left lung and in the left base and axilla. The patient complained of a catch at the left base and coughed up a little blood streaked sputum. Sputum culture showed a variety of organisms with Streptococcus viridans and Neisseria catarrhalis predominating. A chest plate was interpreted as showing intense pulmonary edema in both lung fields, with pleural thickening, and a small amount of fluid in the left cavity. The heart was not enlarged. Clinically it was thought that cardiac failure could not account for all the pulmonary findings, but nevertheless digitalis was started. The patient died on the fifty-second hospital day. Blood cultures were never sterile.

Discussion

DR. GEORGE T. HARRELL: Two interesting problems are presented by this case: (1) the interpretation of a symptom, pain in the chest; (2) the interpretation of a physical sign, the systolic murmur in the heart. The diagnosis of the most prominent pathologic process offers little difficulty, and was proved by repeated blood cultures which were positive for the alpha hemolytic Streptococcus, the organism commonly found in subacute bacterial endocarditis.

Bacterial endocarditis is always engrafted on a valve which has been previously damaged by some pathologic process. Of the common types of heart disease, congenital malformation seems to be ruled out by the absence of positive findings in the family history, and the apparent absence of a murmur preceding hospitalization elsewhere six weeks before admission here. No hypertension was observed and no history or physical findings suggesting arteriosclerosis are reported. A luetic infection at the age of 16, twenty-one years ago, may be presumed from the positive serology at that time, although the history of a primary or secondary lesion is missing. The inadequate treatment would make a tertiary lesion in the cardiovascular or central nervous system likely. The aortic diastolic murmur, the bounding pulses, the increased pulse pressure, and the forceful heart beat are typical of incompetency of the aortic valve—a common syphilitic lesion. The chronic cough might be due to bronchial compression resulting from extension of the syphilitic process to the transverse arch of the aorta, with aneurysmal dilatation and reflex irritation of the respiratory tract.

The systolic murmur at the apex is of considerable importance because of its changing character. This would indicate that the endocarditis had settled on a valve which normally produces murmurs heard at this area. It is possible to have aortic murmurs transmitted to the apex, such as the Austin Flint murmur; but this would be pre-systolic in time, disappearing with the first sound, and would mimic exactly the murmur of mitral stenosis. In the case under consideration,

the murmur was systolic in time, and hence could not be transmitted from the aortic area but must have arisen near the apex. Embolic phenomena were seen in the peripheral circulation and not in the lungs; hence the vegetations could not be in the lesser or pulmonary circulation, but must have been in the left side of the heart on the mitral valve. Syphilitic involvement of the mitral valve is such a rare occurrence that many people do not believe in its existence; the most common lesion of this valve is due to rheumatic fever. The timing of the murmur would indicate insufficiency, but not stenosis. Nothing in the past history suggests an attack of rheumatic fever, but in this latitude, where the climate is more mild than in the North, typical joint findings may be absent and the only symptoms of rheumatic fever may be muscular aches or recurrent sore throats. Since the murmur must have been due to a lesion on the mitral valve, and since the valve must have been damaged in order for vegetations to become engrafted onto it, one must assume that the patient had had rheumatic fever.

How did the streptococcus enter the blood stream? The patient was apparently asymptomatic until he had pneumonia seven months before admission. The recurrence of signs of infection suggest empyema, which was proved by aspiration. It would be interesting to know if the organism recovered from this fluid was the same as the one which subsequently appeared in the blood. The persistence of cough, sputum (occasionally blood streaked), and chest pain at the left costal margin suggests post-pneumonic dilatation of the bronchi which formed a small area of bronchiectasis, probably out near the pleura. To gain entrance to the blood returning to the left side of the heart, the organism must have penetrated the pulmonary veins and may there have formed small thrombi, which would add to the symptoms in the left lower lobe of the lung. The physical signs over this area were typical of thickening of the pleura without the transudation of fluid. The leukocytosis with a shift to the left in the Schilling hemogram, and the hypochromic anemia are evidence of the subacute infection of the blood stream. The absence of albuminuria, the adequate concentrating power of the kidney, as evidenced by the specific gravity, and the normal nonprotein nitrogen of the blood all point to good kidney function; the appearance of red cells in the urine suggests emboli to the kidney. Most patients with bacterial endocarditis show some evidence of nephritis during the course of the disease. It is possible that some of the pain in the left lower chest may have been referred from infarcts also in the spleen. Clubbing of the fingers is a common physical finding in bacterial endocarditis; the absence of cyanosis would preclude the possibility of this being due to a congenital heart lesion.

The episode of very severe precordial pain, radiating down the left arm and accompanied by nausea and vomiting, is typical of an acute coronary thrombosis. The lack of confirmatory findings, such as a drop in blood pressure, and the absence of signs in the chest or in the peripheral pulses, prevent us from definitely establishing this diagnosis on clinical grounds. The electrocardiogram may have been taken before changes appeared, and repeated tracings might have shown alterations typical of this lesion. Embolic coronary occlusion is a very rare occurrence, but since the vegetation was on the mitral valve, it would be possible. If the pain occurred as the result of a lesion in the lung, one would expect changes in the physical signs and, perhaps, aggravation of the pain by respiration. The pain of dissecting aneurysm is equally as severe, but usually follows arteriosclerotic dilatation of the aorta, rather than luetic involvement, and may be referred also to the back and neck.

The terminal events in the last week of life are typical of acute myocardial failure involving the left ventricle. The blood backs up in the lung, fluid exudes, red cells are forced into the alveoli, and the picture of acute pulmonary edema develops. The catching pain at the left base suggests the formation of an infarct. In view of the doubt clinically that cardiac failure could account for all the pulmonary findings, it would be interesting to know if the patient improved temporarily on digitalis.

The therapy of bacterial endocarditis has always been unsatisfactory. The administration of the sulfonamides intravenously to obtain a high initial level and the continuation of the drug by mouth to maintain the level is a procedure which should be tried, but which all too frequently is useless. The intelligent attempt to reach the deeper areas

of the vegetation by irradiation therapy is to be commended. Apparently a temporary improvement was induced. This method of therapy was tried and abandoned some years ago, but advances have since been made in the technique of administration and in the knowledge of proper therapeutic doses. This combined method of therapy offers a logical approach to treatment.

Is it possible that the persistently positive Kahn represents laboratory evidence of an asymptomatic syphilis? No evidence of central nervous system involvement was disclosed in the neurologic examination or in the examination of the cerebrospinal fluid. A syphilitic aneurysm in the transverse arch might be demonstrated only by fluoroscopy and not be seen in the x-ray film. Rheumatic fever, on the other hand, frequently causes lesions of the aortic as well as of the mitral valve. If a systolic murmur had also been heard at the aortic area, one would be more inclined to believe that rheumatic fever also caused the damage to the aortic valve, since syphilis less frequently gives rise to an aortic systolic murmur. The large number of organisms in the blood stream leaving the mitral valve and passing over the lesion in the aortic valve might have become similarly engrafted on this, but no change is described in the quality of the aortic diastolic murmur. Bacterial endocarditis engrafted on a syphilitic valve is not as rare as was once supposed.

It is usually unwise to make two diagnoses where one will suffice, but in view of the convincing evidence that syphilis was present, I shall hazard a guess that the heart had been injured by both rheumatic fever and syphilis.

Dr. Harrell's Diagnoses

Chronic rheumatic heart disease with asymptomatic mitral insufficiency.

Syphilitic aortitis and valvulitis with aortic insufficiency, cardiac hypertrophy and dilatation.

Subacute bacterial endocarditis on the mitral valve, alpha hemolytic Streptococcus, with embolic infarcts of the kidney, spleen and skin.

Coronary occlusion, embolic?

Terminal infarction of the left lower lobe of the lung.

Pleural thickening over the left lower lobe, following empyema.

Post-pneumonic bronchiectasis, left lower lobe.

Thrombophlebitis of the pulmonary veins, left lower lobe?

Pathological Discussion

DR. W. C. THOMAS: The lesions of interest in this case were found in the heart, which weighed 375 Gm. The three leaflets of the aortic valve showed thickening limited to their free edges. There was no evidence of fusion of the valves with adjoining structures. At the point where the anterior and right posterior valves are attached to the aorta there was a thickened, sharply demarcated area measuring 6 mm. in diameter. Large, fungating, reddish-brown friable vegetations were present on each of the aortic valves. The anterior cusp of the mitral valve presented a friable, dark red mass, in the center of which there was a small, irregular opening. This vegetation was located close to the base of the cusp. The mitral valve showed no evidence of rheumatic fever. The pericardial cavity contained 100 cc. of slightly cloudy fluid, and along the course of the marginal branch of the right coronary artery there was an opaque area 2 mm. in diameter. On section, the artery was found to be occluded by a friable white mass. The myocardium throughout was flabby and showed a typical thrush breast effect.

The lungs showed marked congestion with edema. The pleural surface over the left lower lobe was thickened and roughened. Multiple infarcts were found in the spleen (which weighed 250 Gm.), and in both kidneys.

Microscopically the old lesion of the aortic valve showed intimal hyalinization and fibrosis. No evidence of luetic involvement was found. The occluded coronary artery was filled with bacteria and thrombus, and the attendant reaction had destroyed most of the wall of the vessel. Acute myocarditis and marked fatty change were noted in the myocardium.

Sections from the lungs showed marked congestion, intra-alveolar hemorrhage and edema. The spleen and kidneys showed the effects of multiple emboli.

Anatomical Diagnoses

1. Rheumatic aortic valvulitis, healed.

2. Subacute bacterial endocarditis of the aortic valves and the anterior cusp of the mitral valve due to Streptococcus viridans, with arterial emboli to the marginal branch of the right coronary artery, splenic artery and renal arteries.
3. Pulmonary congestion and edema.
4. Pleuritis, healing and healed, of the left lower lobe of the lung.
5. Marked fatty metamorphosis of the liver and myocardium.

MEDICOLEGAL ABSTRACT

J. F. OWEN, M.D., LL.B.
RALEIGH

MALPRACTICE: *Because of allergy and the varying conditions of human systems, the reaction of a particular person to a specific drug is in a large measure unpredictable. The doctrine of res ipsa loquitor does not apply to an unexpected, unanticipated, and unfavorable result of a treatment by a physician.*

This is an account of a civil action instituted to recover damages for personal injuries alleged to have been caused by the negligent treatment rendered by a physician. The essential facts of the case are as follows:

The plaintiff, on the advice of his physician, procured the defendant, the chief surgeon of a hospital, to perform an operation of circumcision. In performing the operation, the defendant used a local anesthetic, which he told the plaintiff was novocain. There were a number of injections. At the point of the first injection a knot arose, which developed into a blister. Later the blister burst, and a process of decay set in, destroying a portion of the tissue. The section covering the blister became black and hard, and could not be removed without the use of vaseline and excision of the affected area. After the defendant had treated the plaintiff for some time, a specialist in a nearby city was consulted. Following several weeks of treatment by the specialist, the place healed, but remained in such condition that the plaintiff at times suffered therefrom. During the treatment, the defendant, upon being asked if the novocain would cause the condition, replied, "No, I don't think so."

There was no evidence that the doctor failed to possess the requisite knowledge, skill and ability to perform the operation, or that he failed to exert his best judgment. No expert testimony was offered, but the plaintiff and his wife appeared as witnesses, and the doctrine of *res ipsa loquitor* (the thing speaks for itself) was depended upon to prove negligence.

In Superior Court a motion was made by the defendant as of nonsuit, and the motion was granted. The plaintiff appealed to the Supreme Court.

When this case was considered in the Appellate Court, this tribunal stated that the cause of action in this particular case was based upon two allegations: first, that the defendant, in undertaking to induce a condition of local anesthesia, used a quantity of liquid containing a high percentage of caustic and deleterious chemical or chemicals; and second, that the defendant failed to diagnose the condition of the plaintiff which developed after the operation and to use proper remedies for its alleviation and ultimate cure. The court further stated that there was no evidence that the doctor failed to use the requisite knowledge and skill of his profession, or that he failed to exert his best judgment in treatment. As to the use of deleterious matters in attempting to induce an anesthesia, it was held that, owing to varying conditions of the human system, the result of the use of any medicine cannot be predicted with certainty. What is beneficial to many sometimes becomes highly injurious to others. It was the opinion of the court that an unsuspected, unanticipated, and unfavorable reaction to treatment by a physician does not invoke the doctrine of *res ipsa loquitor;* especially is it inapplicable to the case at hand. However, it might be mentioned in this connection that in the case of a foreign object left in the body after an operation the doctrine does apply.

The Court could see no reason why the judgment of nonsuit as rendered by the Court below should not be affirmed. (N. C. Supreme Court, Vol. 215, page 384. Decision rendered Spring Term, 1939.)

The hospital must share with the home the disgrace of being a major reservoir of tuberculosis infection. Patients with undiagnosed, as well as diagnosed tuberculosis pass on the disease to employees. Employees take it home to their families. The Modern Hospital, Oct., 1943.

TUBERCULOSIS ABSTRACTS

A Review for Physicians

ISSUED MONTHLY BY THE NATIONAL TUBERCULOSIS ASSOCIATION

VOL. XVII MARCH, 1944 No. 3

OUR national experience with tuberculous veterans of the last war has been unfortunate. Sadder still would be a repetition involving the men and women fighting World War II. This paper, addressed originally to health officers, challenges every physician whose practice embraces a tuberculous veteran or the family of one.

TUBERCULOSIS AMONG VETERANS

During first World War inductions, knowledge and facilities for diagnosis were insufficient to screen out many men suffering from tuberculosis, particularly presymptomatic disease. Thus, many active cases entered the Army. Hardships of training and combat produced still more. After the war, care of tuberculous veterans fell to the newly organized Veterans' Bureau. Hospitals and sanatoria were erected. The service became a major medical activity of the Bureau, and of its successor, the Veterans' Administration. As early as 1923, 23,653 tuberculous veterans were admitted to treatment in one year. At first, care was limited to tuberculosis connected with military service. Subsequently, cases with disease unrelated to military service became eligible. As a result, tuberculosis admissions have continued numerous. During fiscal 1942, after almost a quarter century, hospital admissions numbered 9,658. Over 300,000 such admissions and re-admissions have accrued in hospitals of the Veterans' Administration or other government, state or civil institutions since the last war.

The government has spared no efforts or funds in erecting and equipping modern hospitals and in providing adequate medical personnel. In March, 1942, there were 5,217 beds to meet current needs, embracing tuberculous veterans of the present war and including tuberculosis beds in veterans' psychiatric hospitals. Besides having all costs of hospitalization and transportation to hospitals paid, tuberculous veterans also receive compensation payments scaled from $8 to $100 per month, based on varying grades of dependency and service-connected or non-service-connected disability. Men treated at home may qualify for an additional $50 per month payable to the wife or other attendant. These provisions have tempted many to discontinue hospital care and attempt a cure at home.

Standards of operation in veterans' hospitals are generous. In 1942, excluding overhead, the *per diem* cost of operation was $4.37 per patient and the total direct costs of treatment approached $8,000,000. Compensation of World War I veterans with partial or total disability due to tuberculosis, whether or not service-connected, amounted to approximately $40,000,000 during that fiscal year. Such veterans then still numbered 63,000, and exceeded by many times the number accepting hospital care. Disability payments over the last 25 years aggregate about one billion dollars.

Despite the admirable services available to tuberculous veterans, the experience of their hospitals has been unfavorable. Thus, in 1942, of the 9,854 cases discharged from these hospitals, only 1.9 percent were designated "arrested" at discharge; 0.3 percent "apparently arrested," and 0.8 percent "quiescent"—a bare total of 3 percent medically rehabilitated. The remaining discharges included: "condition improved" 32.7 percent; "condition unimproved" 28.9 percent; "dead" 19.5 percent; and "condition not stated" 16.0 percent. The vast majority were obviously not ready for release. So-called "improved" cases represent, predominantly, patients with unstable lesions, a large proportion leaving the hospital without authorization or consent. Thus, the Veterans' Administration itself classified the hospitalization of 58 percent of the cases as "incomplete." These 1942 figures are rather typical, though somewhat worse than those of earlier years.

Exact comparisons among various sanatoria as to results of treatment on the basis of such crude figures are impossible, particularly now when World War I veterans ad-

mitted are older men, usually with chronic disease. Of recent admissions, only 4 percent were "incipient" cases, 22 percent "moderately advanced," and 74 percent "far advanced." Even so, there is a painful contrast between the results with veterans and those achieved in well managed state, municipal, and private sanatoria. In a 1933-34 survey of tuberculosis hospitals and sanatoria in the United States by the American Medical Association, patients discharged with tuberculosis "arrested," "apparently arrested," or "quiescent," accounted for 29 percent of all discharged. Among Michigan State sanatoria from 1930 to 1934 discharges included 61 percent in these three groups. At Mount McGregor Sanatorium of the Metropolitan Life Insurance Company, of males discharged between 1919 and 1936, and excluding incipient cases, 48 percent were in comparable categories. Even for cases far advanced on admission, the proportion was 34 percent.

This deplorable situation among tuberculous veterans has not developed from lack of desire to help the men. Everyone concerned aimed at optimum care. *The chief failure was by legislators and others interested in veteran welfare to appreciate fundamental conditions necessary for effective treatment.* In part, outside pressure was brought to bear to liberalize financial provisions. These measures actually have minimized effective control over the movement of the tuberculous. Veterans, not subject to ordinary hospital restrictions, come and go almost at will, regardless of their condition and against medical advice. Patients have been readmitted as many as 24 different times. Six to eight admissions of the same man are common despite official effort to educate and persuade patients to complete their hospital care, and measures to exclude offenders from immediate rehospitalization. Much of the discipline essential to success in treating tuberculosis is lacking. Indeed, laws and practices have so evolved that it often financially benefits men to leave the hospital or avoid it altogether. This creates an impossible situation, undermining morale of veterans and professional staff alike.

More serious than mere failure to rehabilitate the patient, discharge before cure exacts its toll on the nation. It has allowed thousands with communicable tuberculosis to return to civilian communities, to live at home or travel about under little or no medical supervision. State and local health officers have assumed little responsibility for men traditionally regarded as wards of the federal government. Few patients have recovered; most have constituted an army of discouraged men spreading tuberculosis in their home communities.

Administration authorities and veterans' leaders are recognizing the need for a remedy, beginning with a drastic change in viewpoint. Specific improvements are being considered and necessary legislative measures will be debated. The American Legion is launching a campaign through its local branches to see that veterans resume and continue hospital treatment until discharged with medical approval.

What is to be done? First, new controls must render liberal benefits medically effective, preventing the drifting of tuberculous veterans until the disease is "arrested" or at least, not a menace.

Second, the medical profession must cooperate with the Veterans' Administration in the follow-up of tuberculous ex-patients. The Administration has indicated that it will release information to state and local health officers, and routines for getting such reports are imperative. Men still in need of sanatorium care who will not stay in veterans' institutions should be hospitalized in state or local sanatoria, with legal power invoked where necessary. Each man's circle of contacts should be thoroughly combed for additional cases.

Finally, a genuine effort must be made to protect the large crop of tuberculous veterans inevitable from the present war. It is likely that the Veterans' Administration will function under regulations and procedures governing the care of veterans of World War I. Already, many of the tuberculous veterans of the new war show the same restlessness and abandonment of hospital care which have produced calamitous results among the older men. With new cases already numerous, the stage may be set for another great medical tragedy. Lack of discipline and mistaken generosity may not only take their toll of young men who deserve to get well and resume useful lives, but may seriously delay control of tuberculosis in the general population—unless we act!

Function of the Health Officer in the Control of Tuberculosis among Veterans, Louis I. Dublin, Ph.D., Amer. Jour. of Pub. Health, Dec., 1943.

MILITARY MEDICINE

Office of Civilian Defense

Dr. George Baehr, Chief Medical Officer of the United States Office of Civilian Defense, retired on March 1 after two and a half years of service. He will be succeeded by Dr. W. Palmer Dearing, who has been Assistant Chief Medical Officer since the establishment of the Medical Division of the Office of Civilian Defense.

In recognition of his services to the hospitals of the country in time of war, the American Hospital Association at its recent annual meeting voted a special citation to Dr. Baehr and elected him to honorary membership.

On his retirement as Chief Medical Officer, Dr. Baehr will resume the professional and teaching responsibilities in New York City which he laid down when called to duty in June 1941 in anticipation of the entry of the United States into the world conflict. He is clinical professor of medicine at the College of Physicians and Surgeons of Columbia University, chief of the first medical service at the Mount Sinai Hospital, New York, and a trustee of the New York Academy of Medicine.

Dr. Dearing is a native of Iowa and a graduate of Washington State College, Pullman, Wash., and of Harvard Medical School, Boston, in 1931. Since 1934 he has been with the U. S. Public Health Service, serving on the staff of the National Institute of Health from 1936 until his appointment to the medical staff of OCD. He assisted in several important health investigations, including the epidemic of poliomyelitis in Los Angeles in 1934.

Laurinburg-Maxton Army Air Base

The first "graduating class" of the Army Air Forces' convalescent training program at Laurinburg-Maxton Army Air Base hospital received certificates last month denoting completion of at least 10 hours' training.

Gaining widespread acclaim as a result of its success in Army Air Forces hospitals throughout the nation, this program is designed to prevent a soldier from wasting his time while a patient in the hospital. There are three chief objectives: to build morale, to send the soldier back to his job in the best possible physical condition, and to improve his technical knowledge.

The program at Laurinburg-Maxton, which started in earnest last fall, has grown so rapidly that it now covers practically every subject that is interesting or helpful to a soldier-patient. It can be broken down, however, into three main parts: exercise, manual arts and instruction.

The program at Laurinburg-Maxton usually is planned for three hours each morning except Sunday. The first hour is "ward fatigue," which is nothing more than a period set aside for cleaning the wards. This is regarded as part of the patient's Army training in discipline and neatness—two requisites of a good soldier. The other two hours include the movies, lectures and calisthenics.

In the afternoons the patients are free to do as they please, and most of them make use of the workshop or the Red Cross recreational facilities.

The certificates awarded for 10 hours' training thus can be obtained easily in three or four days. This keeps them within reach of most of the patients, no matter how short their convalescent period.

BULLETIN BOARD

News Notes From the Bowman Gray School of Medicine of Wake Forest College

Dr. Tinsley R. Harrison has resigned as Professor of Medicine and accepted a position as Dean of the Faculty and Executive Professor of Experimental Medicine and Professor of Internal Medicine at the Southwestern Medical Foundation Medical School at Dallas, Texas. Dr. George T. Harrell, Jr., Assistant Professor of Medicine, has been appointed director of the department. Dr. J. C. Pass Fearrington has been promoted to Associate Professor of Clinical Medicine. Dr. Frederick R. Taylor has been promoted to Professor of Medical Literature.

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Miss Mary Ament, formerly assistant librarian at the Tulane University School of Medicine, has accepted the position of librarian at the Bowman Gray School of Medicine. She replaces Mrs. Archie Smith, who has recently resigned.

News Notes From the University of North Carolina

Dr. William deB. MacNider, Research Professor of Pharmacology, delivered a paper on "The Stability of the Acid Base Equilibrium of the Blood in Animals of Different Age Periods" at the meeting of the Club for Research on Ageing in New York on February 5.

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Dr. W. R. Berryhill attended the meeting of the Congress on Medical Education and Hospitals in Chicago on February 14 and 15.

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Dr. S. H. Hopper, Assistant Professor of Sanitary Engineering and Special Consultant of the United States Public Health Service, gave a lecture at the Orientation Course at the National Institute of Health in Bethesda, Maryland, on January 20.

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The Division of Sanitary Engineering of the School of Public Health is running a special war emergency training program for sanitarians which will last for four weeks. Besides North Carolinians there are representatives from the states of Illinois and Virginia. The course is being given in collaboration with the University, the Public Health Service, and the State Board of Health.

News Notes From the State Board of Health

During the year 1943, the second full year of our participation as an active belligerent in World War II, 95,251 babies were born in North Carolina, to set an all-time record and bring the rate up to 25.7, as compared with 24.6 in 1942, when the number of births reported was 90,056. We have in the past established higher rates—in fact, we once led the entire Union in that respect—but our population was smaller than it now is, and the actual number of births was not nearly so great.

During the past year, the number of deaths reported was 30,072, which kept the state's death rate at 8.1, the all-time low record established in 1942. Births recorded during 1943 exceeded the number of deaths by 65,179.

Deaths among infants under a year old totaled 4,434, which brought the rate **down** from 47.5 to 46.6, while the maternal rate, despite the substantial increase in the number of births, was reduced from 3.4 in 1942 to 3.3 in 1943.

There were, during the past year, 1,526 deaths from what are termed preventable accidents, as compared with 1,513 in 1942, but the 1943 total includes the victims of the Atlantic Coast Line disaster of December and certain other casualties which were much higher than in previous years.

The influenza epidemic, which was responsible for 104 deaths in December, as compared with only 36 in December, 1942, brought the 1943 total of deaths from influenza to 440, against 296 the preceding year. The epidemic was reflected in deaths from pneumonia during December, of which there were 226, carrying the year's total to 1,692, which was 15 in excess of the 1942 total. But the rate dropped from 45.8 to 45.7.

As might have been expected, there was an increase in cancer deaths, which last year numbered 2,317, as compared with 2,219 in 1942, while the rate rose from 60.6 to 62.6.

Tuberculosis deaths, however, continued to decline, numbering 1,445 against 1,578 the preceding year, while the death rate from all forms of tuberculosis fell from 43 to 39.1. This presents a strong argument in favor of the untiring efforts of those who are battling against the great white plague.

North Carolina last year shared in the increased number of deaths resulting from epidemic cerebrospinal meningitis, with 52, as compared with only 19 in 1942. For some reason there has been a sharp increase in the number of meningitis deaths throughout the entire country for the past year. However, there were encouraging reports as to the successful treatment of this disease, **but for which** the fatality list undoubtedly would have been much larger. Treatments administered among the armed forces have been strikingly successful.

Suicides in North Carolina during the past year numbered 253, against 237 in 1942. The 1943 report shows a decline in the number of homicides, with only 258, as compared with 337 the preceding year.

That the fight against malaria continues to show results is indicated by the fact that malaria deaths in North Carolina last year numbered only 22, as compared with 37 the previous year, while the rate fell from 1 to 0.6. In 1922, for example, there were 177 deaths from malaria in North Carolina, and as late as 1935 there were 94 such deaths.

As to typhoid fever, there were only 19 deaths from that preventable disease in North Carolina last year, compared with 299 in 1922 and 83 as late as 1935.

There were only 56 diphtheria deaths in this state last year, as compared with 164 as late as 1935. The rate has dropped from 19.2 in 1922 to 1.5 last year. Diphtheria should, of course, be practically non-existent in North Carolina.

One of the most encouraging features in this report on 1943's vital statistics is that our death rate has been held down to its lowest level in our history, despite the phenomenal increase in births; and that our infant mortality rate not only has **not** advanced with the increased number of births, but has declined. This is **especially** significant when we consider the absence of so many physicians and nurses who have entered the armed forces, and it speaks well not only for the public health clinics dedicated to the care of mothers and infants but for the private practitioner of medicine.

News Notes From the North Carolina Tuberculosis Association

The 1943 goal set for the sale of Christmas Seals in North Carolina was $150,000. It now looks as if $175,000 is in the bag. The goal set for 1943 was 22 per cent over the 1942 sale, and an increase of 42 per cent will probably be realized. Thus far, 159 places have reported a total sale of $164,546.59 as compared to $104,511.26 for these same places in 1942. This represents an increase in these places already reported of $60,035.33 or 57 per cent. There are yet 33 places not heard from.

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The 40th anniversary meeting of the National Tuberculosis Association is scheduled for the Hotel Stevens, Chicago, May 10-12.

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The Rehabilitation Committee of the North Carolina Tuberculosis Association met at the Mecklenburg County Sanatorium on February 8. The members of this committee are: Dr. M. D. Bonner, Chairman; Dr. H. L. Seay; Dr. Derwin Cooper; Dr. S. M. Bittinger and Mrs. Charles E. Platt. Invited guests were: Miss Ruth Harris, Charlotte; Miss Janie Tuttle, Mecklenburg Sanatorium; Mrs. Elizabeth Stainbrook, Durham; Mrs. Mildred Greene, Greensboro and Dr. S. H. Johnson, Mecklenburg Sanatorium.

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At a meeting of the Executive Committee of the Nash County Tuberculosis Association on February 9, at which a representative of the State Office was present, it was decided to petition the County Board of Commissioners to build an addition to the county sanatorium in order to supply separate rooms where gravely ill patients might be placed. At the present time, there are no facilities for isolating such patients from the occupants of the wards. The Committee also approved Dr. Chamblee's plan for x-raying all the high school freshmen, and perhaps the seniors as well, each year. Dr. McCain has agreed to furnish a technician for taking the x-rays at the local sanatorium, and the County Tuberculosis Association will pay for the film. Dr. Chamblee, who is the county health officer, will investigate the source of infection for each case discovered in the school children, and in this way hopes to uncover adult cases. By carrying on this procedure for a number of years, it is thought that most of the families in the county will be reached. There was discussion, too, about health education. As a result, Dr. Chamblee will order a movie projector, following the suggestions contained in the January "News Letter" from State Office. It was indicated that the Committee would be willing to help defray the cost of such a machine, to make possible the showing of films on tuberculosis to school children, civic groups, etc. Before the meeting adjourned, Miss Mary Philips, president, expressed the grateful appreciation of the Association for the fine efforts of Mr. Astor Dozier as seal sale chairman.

Resolution Passed by Edgecombe-Nash Counties Medical Society

WHEREAS, the Edgecombe-Nash Counties Medical Society at its session held on December 8, 1943, adopted two resolutions reading as follows:

WHEREAS, the incidence of tuberculosis in the general population has heretofore increased following each of the wars in which the country has engaged: and

WHEREAS, there are now available death and morbidity statistics to indicate that sickness caused

by tuberculosis is now increasing locally; and indications point to a probable general increase in tuberculosis; and

WHEREAS, the death and morbidity rates of tuberculosis continue to be approximately 100 per cent greater among the Negroes than among the white race; and

WHEREAS, no part of the population is safe against this communicable disease until all segments of the population in our community are free of it; and

WHEREAS, improved diagnostic facilities which are expected to become generally available in the near future will make earlier diagnosis possible and may thereby increase the demand for sanatorium beds, temporarily at least; and

WHEREAS, the number of Negro patients with tuberculosis in Nash and Edgecombe counties sometimes exceeds the sanatorium beds available for their immediate and proper isolation and treatment; and

WHEREAS, the homes of Negro patients rarely afford the room space or other means needed for their isolation at home:

WHEREAS, the tuberculosis problems of most other central and eastern North Carolina counties are similar to those described above; and

WHEREAS, most of these counties, if not all of them, of necessity depend upon the facilities of the State Sanatorium for adequate care and treatment;

Therefore, the Edgecombe-Nash Counties Medical Society

RESOLVES:

1. To recommend to the County Commissioners of Edgecombe County and of Nash County that additional sanatorium beds be provided for the treatment and isolation of Negro tuberculosis patients of their respective counties.

2. To recommend to the Governor of North Carolina that additional beds be provided in the State Sanatorium for Negro tuberculosis patients.

Edgecombe-Nash Counties Medical Society

The February meeting of the Edgecombe-Nash Counties Medical Society was held in Rocky Mount on February 9, with Dr. Hugh Thompson of Raleigh as guest speaker. His subject was "Fractures of the Femur Without External Splinting". Dr. C. W. Bailey of Rocky Mount discussed the question, "What Is the Best Treatment for an Earache?"

Officers of the society for 1944 are: President, Dr. J. Allen Whitaker; Vice President, Dr. Marvin L. Stone; Secretary-Treasurer, Dr. Samuel H. Justa; New Member, Board of Censors, Dr. Margaret Battle. All are from Rocky Mount. The Delegate to the State Society is Dr. Newsom P. Battle of Rocky Mount, with Dr. J. G. Raby of Tarboro as alternate.

Forsyth County Medical Society

The Forsyth County Medical Society met in Winston-Salem on February 8, 1944. Dr. W. A. Wolff, Assistant Professor of Pathology and Toxicology at the Bowman Gray School of Medicine, spoke on "The Use of Plasma in Burns".

News Notes

Dr. Chauncey L. Royster, of Raleigh, has received the James R. Lisa award for "meritorious work in research medicine", bestowed by the Society of the Alumni of the City Hospital in New York. His paper, "Anatomic Findings in the Heart in Combined Hypertension and Syphilis", was adjudged as the best contribution submitted.

Before locating in Raleigh for the practice of internal medicine, Dr. Royster served as intern and resident in the City Hospital. He is now a Captain in the Medical Corps, Army of the United States, and is stationed overseas.

Symposium on War Medicine in "The Hebrew Medical Journal"

The attention of the medical profession is directed to the appearance of Volume I and II, 1943, of **Harofe Haivri** (The Hebrew Medical Journal), a semi-annual publication, edited by Moses Einhorn, M.D.

Both volumes are dedicated to a timely symposium on war medicine. Among the subjects discussed of particular interest are "The Treatment of Gunshot Wounds of the Head and Brain during the Present War" by Dr. Leo M. Davidoff; "The Early Treatment of War Wounds with Emphasis on Prevention of Deformities" by Dr. J. W. Maliniac; "Some Personal Observations on Military Surgery" by Dr. Ed. K. Barsky; "Newer Conceptions of the Treatment of Burns" by Dr. Jesse Bullowa and Dr. C. L. Fox, Jr.; "The Status of Anesthesia in Military Surgery" by Dr. S. D. Ehrlich; "Shock Syndrome and Its Treatment" by Dr. S. Standard; "Ocular Injuries in Chemical Warfare" by Dr. Ed. B. Gresser; "Physical Therapy in War Medicine" by Dr. Wm. Bierman; and "The Importance of the Proper Prosthesis in Post-War Rehabilitation" by Dr. H. M. Wertheim.

In addition to an English-Hebrew medical dictionary, the original articles are summarized in English.

For further information, communicate with the editorial office of **The Hebrew Medical Journal**, 983 Park Avenue, New York 28, N. Y.

Russian War Relief, Inc.

Officers of Russian War Relief reported to the agency's board of directors at a meeting in the Bankers' Club of America, 120 Broadway, New York City, that $16,781,333.74 worth of relief supplies were consigned to the Soviet Union during 1943. A total of $15,596,600.63 worth was shipped and an additional $1,182,733.11 worth was in transit at the year's end.

American Physicians' Art Association

will have its seventh annual exhibit at the A.M.A. convention, Stevens Hotel, Chicago, June 12-16, 1944.

Everyone was impressed by the beauty of the Art Exhibition at the Atlantic City Session last year, but the 1944 Gallery in the main ballroom balcony will be even more beautiful and impressive.

Through the courtesy of Mead Johnson & Co., Evansville, Ind., there will be no fees for hanging and no express charges either way. The type of art to be exhibited includes personal work of the following types of medium: oil portraits, oil still life, landscapes, sculpture, water color, pastels, etchings, photography, wood carving, leather tooling, ceramics and tapestries (needle work). All pieces should be sent preferably by railway express collect, automatically covered with $50 insurance.

Exhibitors should send NOW for entry blanks to Dr. Francis H. Redewill, Secretary, A.P.A.A., Flood Building, San Francisco; one entry blank should be used for each medium in which it is desired to exhibit.

There will be about 100 trophies, including medals and plaques.

Medical and Surgical Relief Committee of America

Funds contributed to the Medical and Surgical Relief Committee by the Auxiliary to the Medical Society of the State of North Carolina have enabled the Committee to donate an emergency medical field set to the U.S.S. **Fremont**, a destroyer, Dr. Joseph P. Hoguet, medical director of the Committee, announced from New York City headquarters. The medical set has already been received by the medical officer on board the **Fremont**, Lt. Comdr. Sydney A. Thompson, formerly stationed at the Naval Auxiliary Air Station at Elizabeth City, N. C.

Valued at $110, the emergency field set was requested by the destroyer as part of the equipment required to set up a mobile battle dressing station. Dr. Hoguet pointed out that an emergency operating set, valued at $225, would complete the sorely-needed dressing station for the **Fremont**. $13 has already been raised by the Auxiliary to provide the warship with this companion kit.

Bandages, drugs, antiseptics, syringes, sutures, needles, minor surgery instruments and other supplies, carried in 2 sturdy valise-sized cases, make up the emergency field kit. The operating set, which the Auxiliary soon hopes to send to the **Fremont**, is a heavy canvas roll holding more than 75 instruments, ready to cope with any emergency operation from an appendectomy to an amputation. Dr. Hoguet pointed out that in the event of damage to the ship's hospital quarters, the two sets offer reserve supplies, insuring medical aid to a fighting crew.

The Auxiliary's donation to the **Fremont** is part of a drive the Auxiliary is conducting to help the Committee and its medical relief program. The Auxiliary launched the campaign throughout North Carolina on December 7, with a sale of Committee emblems and matches.

Conducted by a nation-wide group of doctors, the Medical and Surgical Relief Committee is a philanthropic organizaton dedicated solely to medical aid for the United Nations. It has donated over $611,000 of medical, surgical and dental supplies to naval and military units of the Allied nations, to war-zone hospitals, needy welfare agencies, first-aid stations, medical missionary clinics and community nurseries throughout the free world.

Color Films

The motion picture in color, "Continuous Caudal Analgesia in Obstetrics," which was made available by Eli Lilly and Company, Indianapolis, for showing before medical societies and hospital staffs, has been in continuous demand since release several months ago. It was made at the U. S. Marine Hospital, Staten Island, by authorization of the Surgeon General, U. S. Public Health Service, and the demonstrations were carried out by Drs. Hingson and Edwards, originators of the technic.

The three films that were made at the Nutrition Clinic of the University of Cincinnati in the Hillman Hospital, Birmingham, Alabama, under the joint auspices of the Department of Internal Medicine at the University of Cincinnati and the University Hospitals of Cleveland have likewise been in constant circulation. One of these deals with thiamin chloride deficiency, one with nicotinic acid deficiency, and the third with ariboflavinosis.

None of the films contain advertising. They are available to physicians for showing before medical societies and hospital staffs.

AUXILIARY

DOCTOR'S DAY

Mrs. L. R. Massengale of Lumpkin, Georgia, Chairman of Doctor's Day for the Woman's Auxiliary to the Southern Medical Association, has written a short history of the observance of this day, from which the following excerpts are taken:

"The Woman's Auxiliary being proud of its great Doctors and their noble work wish to pay tribute to them—thus Doctor's Day.

"In 1933 Mrs. C. N. Almand, Winder, Georgia, introduced before Barrow County Auxiliary the following resolution: 'Resolved by the Auxiliary of Barrow County Medical Society that March 30th, the day that famous Georgian Dr. Crawford W. Long first used Ether Anesthesia in surgery, be adopted as Doctor's Day, the object to be the well-being and honor of the profession, its observance demanding some act of kindness, gift, or tribute in remembrance of Doctor's Day.' This plan was presented in 1933 to the Georgia State Auxiliary but was not adopted until the Annual State Session held in Augusta in 1934.

"In June, 1935, at Atlantic City Mrs. J. Bonar White, President of the Woman's Auxiliary to the Southern Medical Association, presented the plan to the National Auxiliary where it was adopted, and a recommendation made that each State select a day which would celebrate an outstanding medical achievement in their own state."

North Carolina has chosen March 30 as Doctor's Day, thus paying tribute not only to our doctors, but to Dr. Crawford W. Long, the discoverer of anesthesia. Following are a few suggestions for observing Doctor's Day:

1. Publish a tribute to our doctors in your local newspaper.
2. If a broadcasting station is available, have the auxiliary sponsor a Doctor's Day program.
3. Send telegrams, letters or notes to each doctor in your county, expressing best wishes.
4. Send flowers to doctors' offices, hospitals or clinics.
5. Send a boutonniere to each doctor to wear as a reminder of our love, respect and appreciation of him.

6. Place flowers on the graves of deceased doctors in your local cemetery.
7. Visit the sick and retired physicians, or remember them with flowers or notes.
8. Plan a social function for your medical society — barbecue, luncheon, dinner, dance or picnic.
9. Plant trees in honor of your medical society.
10. Buy war stamps and bonds for your doctors.
11. Send newsy, cheerful letters to doctors who are serving with the armed forces.
12. Devote the day of March 30 to your doctor and our doctors.

MRS. R. S. MCGEACHY
New Bern
Chairman, Doctor's Day

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CUP PRESENTED TO AUXILIARY

A doctor, a member of the State Medical Society, who wishes to see our organization grow and develop has presented the Auxiliary with a check for $125.00 and a loving cup. By this gift it is hoped to stimulate an eager, larger, and more active group. The cup—to be called an award of excellency—is to be presented to the district that has accomplished the maximum aim of the State Auxiliary. Accompanying the cup each year will be a check for $25.00 to be donated to the Auxiliary's major projects, which at this time are our hospital beds. The $125.00 which we have received will take care of the award for five years. The cup will rotate, but if any district receives it three or four years in succession they will keep it and another will be placed in circulation.

It has been suggested that a number of points go for membership and a number for the various activities sponsored. The points will be given on a percentage basis rather than on the basis of actual numbers because of the unequal population of our districts. The award will be made at the May meeting. It is hoped that all units will compete for this honor.

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WILSON COUNTY—A NEW AUXILIARY

On January 29, 1944, Mrs. Eric Bell of Wilson invited the doctors' wives to meet with her for the purpose of organizing a medical auxiliary. Mrs. K. B. Pace, State President, was present and explained the meaning of the organization. She stated that the Auxiliary was for usefulness as well as for making social contacts.

There were approximately thirty interested women present, and the following officers were elected: President, Mrs. Eric Bell; Vice President, Mrs. E. L. Strickland; Secretary, Mrs. H. F. Easom; Treasurer, Mrs. C. E. Simons.

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GREENVILLE PEOPLE HELP WORTHY CAUSE

The Greenville German Club donated $25.00 to the Auxiliary of the Medical Society of the State of North Carolina to help buy an emergency medical field set for the destroyer, *Fremont*. The ship's medical officer, Lt. Comdr. Sydney A. Thompson, has acknowledged receipt of the field set. This gift was in connection with a drive the Auxiliary has conducted to promote the medical relief program.

BOOK REVIEWS

Minor Surgery. By Frederick Christopher, S.B., M.D., F.A.C.S., Associate Professor of Surgery at Northwestern University Medical School, Chicago; Chief Surgeon at the Evanston (Ill.) Hospital. Fifth Edition, Reset. 1006 pages with 575 illustrations. Price, $10.00. Philadelphia and London: W. B. Saunders Company, 1944.

Christopher's **Minor Surgery** has acquired a well-deserved reputation as the **vade mecum** of students and interns in surgery. The present edition should add greatly to the book's reputation, for it has been entirely reset and brought up-to-date with the addition of the latest advances, including war surgery. Wound healing, the sulfonamides, penicillin, propamidine, the treatment of burns, and dicumarol are some of the new subjects which receive attention. The text is more than merely a description of minor operations. It considers the pathogenesis, diagnosis and treatment of the majority of all surgical affections encountered by the general practitioner. The only omission of general interest noted by the reviewer is a consideration of protruded intervertebral disc, which has recently acquired importance as a common cause of back pain. As was pointed out by the author, it is often the improper care of so-called "minor" surgical conditions which leads to serious results. The book is well-documented, with frequent quotations from the original literature and ample references to the recent literature which are conveniently placed as footnotes. Special chapters on "The Surgical Intern" and "Preoperative and Postoperative Care" are appended. This book should be in the hands of every surgical intern and can be recommended to the general practitioner who desires to keep abreast of the latest techniques.

Pain Mechanisms. A Physiological Interpretation of Causalgia and Its Related States. By W. K. Livingston, M.D., Lieutenant Commander, United States Naval Reserve, Assistant Clinical Professor of Surgery, University of Oregon Medical School. 253 pages. Price, $3.75. New York: The Macmillan Company, 1943.

In this very stimulating and readable book the author reviews the known anatomy, physiology and psychology of pain. He then attempts to correlate this knowledge with his own wide experience in the treatment of common forms of intractable pain (including causalgia, chronic low back disability, facial neuralgia and phantom limb pain).

Dr. Livingston reminds us that all pain is psychic but that no pain should be dismissed as purely psychic, even though its mechanism may not, at first sight, appear to be explainable in simple physiological or anatomical terms. Such pain often involves a vicious cycle. Irritation of "trigger points", which can often be located only after careful search, leads to muscle spasm and vasomotor changes that are capable of creating new sources of pain. Central nervous dysfunction results, perhaps from alterations in the internuncial neurones, and if the cycle remains unbroken it tends to become permanent. Pain, from its initial protective function, alters in intensity and location and becomes destructive. Early blockage of impulses or removal of irritation at the trigger point often breaks the cycle. A single injection of novocain may suffice, though often repeated treatments or more radical surgical procedures may be necessary to effect a permanent cure. Interesting case histories are cited.

The physiology of these vicious cycles remains obscure and the author points out the need for future studies in collaboration with laboratory workers in physiology and neurology.

Surgical Errors and Safeguards. By Max Thorek, M.D., LL.D., D.C.M., F.I.C.S., Professor of Surgery, Cook County Graduate School of Medicine. Ed. 4. 1085 pages, with 794 illustrations. Philadelphia: J. B. Lippincott Company, 1943.

This large volume, now in its fourth edition, covers almost the entire field of surgery, and contains in most part the clinical impressions and opinions of the author, who has had wide surgical experience covering many years' work.

The book is fairly well organized, but contains much material that is empirical and superficial. It is a rather peculiar mixture of the elementary and esoteric. Although dedicated to surgical errors and safeguards, the text deviates frequently into the field of general surgical therapy. Many of the references given are not the most recent ones available.

The last chapter, written by Dr. H. W. Smith, Associate in Medical-Legal Research at Harvard Law School and Harvard Medical School, deals with legal responsibility for surgical practice. It is brief but well written, and should be helpful.

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